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A NOTE ON THE RELATIONSHIP BETWEEN SALES AND ADVERTISING OF DEPARTMENT STORES[1]

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I. THE HYPOTHESIS

THE relationship between sales and selling expense for any business enterprise may be described by a function homogeneous in the first degree. This was the hypothesis set forth by the authors for the purpose of study.[3] The existence of homogeneous functions in the field of production has been suggested by economists and has received inductive support in the studies by Cobb and Douglas.[4] Apparently, however, the hypothesis has not been advanced or tested in the field of marketing.

[1] The authors acknowledge their indebtedness to the Bureau of Business Research, Harvard University, for release of the data used in Sec. II.

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[3] Homogeneous functions of the first degree may be described as mathematical relationships wherein each variable of the function may be increased by a given amount and a result obtained equal to the original function multiplied by the same given amount. Examples of functions homogeneous in the first degree are:

$$x + x^{1/2}y^{1/2} + y; \qquad [4x + (4x)^{1/2}(4y)^{1/2} + 4y] = 4(x + x^{1/2}y^{1/2} + y) \tag{1}$$

$$\sqrt{x^2 - y^2}; \qquad \sqrt{(3x)^2 - (3y)^2} = 3\sqrt{x^2 - y^2} \tag{2}$$

[4] C. W. Cobb and P. H. Douglas, "A Theory of Production," *American Economic Review, Supplement*, 1928, pp. 139–65.

Furthermore, it is the authors' suggestion that within the relevant range the function is of the general type, $S = AX_1^{k_1} X_2^{k_2} X_3^{k_3} \ldots . X_n^{k_n}$, where S represents sales, A represents a constant, X_1, X_2, X_3, and X_n represent possible selling factors such as advertising, occupancy, and pay roll, and each value of k represents the relative importance of each factor of selling effort in the explanation of sales.[5] Thus, the hypothesis describes the relationship between sales and selling effort only if all other factors influencing sales (i.e., changes in income of buyers, etc.) remain constant.

In this study advertising expense was assumed to be a factor of selling effort which, with other factors such as personal selling, administrative expense, occupancy, etc., could be applied to creating or increasing sales volume. This assumption seems to be justifiable because advertising may be substituted for personal selling or occupany expenses, and vice versa, in securing desired sales-volume results. In fact, advertising as a factor of effort is a closer approximation to the theoretical concept than is a given machine as a factor of production. Advertising can be varied independently of other selling effort and will tend to exercise a continuous effect on sales, whereas an increase in the number of a given machine may have no effect on physical output unless accompanied by a corresponding increase in raw materials or labor, or both.

General support for the hypothesis is the common-sense observation that, if you double the advertising, double the sales force, double the customer traffic, and all other factors of effort, you will double the sales volume. This general relationship is adequately described by a function homogeneous in the first degree.

If the hypothesis set forth is true, and advertising is considered a factor of effort, several interesting results may be expected. First of all, since the values of k_1, $k_2 \ldots . k_n$ are constant, advertising expense should be a constant proportion of total selling expense, regardless of the relative costs of advertising and other factors of selling effort.[6] If advertising costs (e.g., the milline rates)

[5] $k_1 + k_2 + k_3 + \ldots . + k_n = 1$.

[6] This assumes, of course, that dollar advertising expense and dollar pay-roll expense, etc., are adequate measures of advertising and other selling effort.

are high relative to wage rates, we would expect to find more salespeople being employed and less square inches of advertising space than where equal sales volume was being obtained, but where the relative costs were reversed. This would be true even if the absolute costs of advertising were higher in the second instance than in the first, provided that in the second instance the advertising cost was lower relative to wages or other selling expenses. In both cases, however, the relation of total dollar advertising expense and total dollar pay-roll expense to total selling expense would be the same. If gross margins were the same, the ratio of advertising expense to total sales would also be a constant.

In other words, this means that advertising, or any other selling expense, should tend to be a constant proportion of total sales and therefore gives logical support to the percentage of sales method of determining advertising appropriations. The hypothesis is by no means a complete justification of this method because it fails to take into consideration such factors as changing business conditions, changing consumers' incomes, etc., and further it implies that advertising is infinitely expansible. It does, however, stress the tendency for dollar amounts of advertising for any given total of selling expenses to remain constant regardless of the relative costs of various methods of selling.

It would, of course, be possible to explain a more or less constant relation of advertising to sales in terms of custom or of institutional patterns, i.e., that one business enterprise copies the action of others without reason. It seems unlikely, however, that every entrepreneur has blindly followed custom; furthermore, in some industries small but persistent differences in the advertising ratio are known to exist. This point will be discussed later.

It also follows, if our basic hypothesis is true, that for stores having a certain dollar amount of selling expense, per capita sales under any given set of conditions would be highest for those stores where advertising expense was the "proper" proportion of all selling expense. If advertising expenditures were either higher or lower than this proportion, maximum results, in terms of per capita sales, would not be obtained. To illustrate this point, let us assume that 5 per cent of sales is the "proper" advertising propor-

tion. It would then follow that stores in which advertising expenses were 5 per cent of sales would show higher per capita sales than stores where advertising expense was 3 or 7 per cent of sales, providing that the proportionate allocation of other selling expenses remains the same. This aspect of the hypothesis stresses the interrelationships of the various factors of selling effort and gives a concrete meaning to the otherwise vague term "balanced appropriation."

One further generalization may be drawn from the hypothesis —that there are diminishing returns from additional advertising outlays, other factors being constant.[7] This means that stores increasing their advertising budget without changing their location, increasing their sales force, or making any other basic changes will obtain increased volume of sales, but the increases in sales from given increases in advertising will be less and less in absolute amounts.[8] Or, to look at the matter in another way, a group of stores identical in all important characteristics except advertising expense (and consequently total selling expense) would show differences in sales volume. Those stores with the greatest volume of advertising would show the greatest sales, but the differences in sales between stores would be less and less for any given difference in advertising expense as the absolute amount of advertising expenditure increased.

A priori, the very fact that selling expenses are divided between a number of factors is evidence that there are diminishing returns for any one taken singly. Here, again, however, the known facts might be explained in institutional rather than economic terms.

II. THE TESTS

The discussion of the hypothesis in Section I leads one to expect three types of relationships between sales and advertising of department stores: (1) a tendency for advertising expense to bear a

[7] On the basis of the assumed function, the curve of diminishing returns would be a rectangular hyperbola.

[8] This statement is based on the assumption that competing stores take no action in regard to their own advertising. Should increases in advertising expenditure be matched by other stores, the increase in sales for the initiating store would be very much less—possibly zero.

constant relationship to total selling expense (it would bear a constant relationship to sales if gross margins were constant); (2) a tendency for extremely high or low values in the proportion of advertising expense to total sales to be associated with low sales volume for any given level of sales expense; and (3) diminishing returns from advertising when advertising alone is increased.

To test adequately the expected relationships just stated, accurate and detailed information on sales, advertising, location, competition, local business conditions, etc., would be necessary for a large number of stores. In fact, it would be desirable to accumulate all the information necessary to explain completely variations in sales volume over periods of time and between trading areas. Because of limited time and inadequate information, such an investigation could not be carried out. However, it was possible to make some rough tests which indicate the method that might be followed and the difficulties that might arise in a more detailed study.

To investigate the first relationship, data on the relative proportions of advertising and other expenses were secured from the reports on department and specialty stores issued by the Bureau of Business Research of Harvard University. Only those reports issued since 1930 were used, as the data in previous issues were presented in such condensed form that it made comparisons with the following periods difficult. Specific references to the reports are given in the tables presented.

TEST I. *Is there a tendency for advertising to bear a constant relationship to total selling expense?*—There are in total selling expense uncontrollable factors such as taxes, traveling expenses (to the extent that they are a function of the distance from central markets), and other factors. Because of this, and because of differences in gross margins, advertising expense was calculated as a percentage of the sum of pay-roll, occupancy, and advertising expenses instead of as a simple percentage of total sales. Pay-roll and occupany expenses not only are more controllable but represent, with advertising, the major part of total selling expenses.

Table 1 shows the results obtained. It will be observed that between sales-volume groups the relationship is not a constant

TABLE 1

ADVERTISING, PAY-ROLL, AND OCCUPANCY EXPENSES AS A PERCENTAGE OF THEIR TOTAL FOR ALL REPORTING DEPARTMENT STORES, 1930–38

YEAR	SELLING EXPENSES	SALES-VOLUME GROUPS (000 OMITTED)									
		Less than $150	$150–$300	$300–$500	$500–$750	$750–$1,000	$1,000–$2,000	$2,000–$4,000	$4,000–$10,000	$10,000–$20,000	$20,000 or More
1938*	Advertising	8.9	10.4	11.9	11.1	14.4	15.3	14.4	15.0	14.5	12.9
	Pay roll	72.8	74.3	72.7	73.8	70.2	68.6	68.3	67.2	67.7	65.9
	Real estate	18.3	15.3	15.4	15.1	15.4	16.1	17.3	17.8	17.8	21.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1937†	Advertising	9.1	11.9	12.2	12.3	14.1	14.6	14.3	15.2	13.9	13.1
	Pay roll	73.7	73.4	73.1	73.1	71.8	69.9	68.1	68.5	69.8	67.0
	Real estate	17.2	14.7	14.7	14.6	14.1	15.5	17.6	16.3	16.3	19.9
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1936‡	Advertising	9.8	11.4	11.8	12.2	14.1	14.7	14.9	15.6	14.8	12.8
	Pay roll	73.6	74.1	73.4	72.4	70.7	69.2	66.6	67.4	67.8	66.8
	Real estate	16.6	14.5	14.8	15.4	15.2	16.1	18.5	17.0	17.4	20.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1935§	Advertising	8.5	11.0	11.9	12.9	13.7	14.5	15.2	15.6	14.1	12.4
	Pay roll	74.6	72.9	72.0	72.2	70.0	68.5	66.5	66.6	67.6	65.6
	Real estate	16.9	16.1	16.1	14.9	16.3	17.0	18.3	17.8	18.3	22.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Basic data from Bureau of Business Research, *Harvard Bulletin*, No. 109, p. 13.
† *Ibid.*, No. 106, p. 18.
‡ *Ibid.*, No. 104, p. 9.
§ *Ibid.*, No. 100, p. 5.

TABLE 1—*Continued*

Year	Selling Expenses	Sales-Volume Groups (000 Omitted)									
		Less than $150	$150–$500	$300–$500	$500–$750	$750–$1,000	$1,000–$2,000	$2,000–$4,000	$4,000–$10,000	$10,000–$20,000	$20,000 or More
1934‖	Advertising	8.5	10.7	11.8	13.3	11.9	13.9	15.2	15.8	13.4	12.3
	Pay roll	73.6	73.8	71.9	69.7	71.4	68.5	65.6	66.0	65.6	64.7
	Real estate	17.9	15.5	16.3	17.0	16.7	17.6	19.2	18.2	21.0	23.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1933¶	Advertising	9.1	10.2	12.1	13.7	12.9	14.1	15.3	15.7	13.9	11.5
	Pay roll	72.8	72.5	72.1	68.2	68.6	67.7	64.0	64.5	64.5	62.0
	Real estate	18.1	17.3	15.8	18.1	18.5	18.2	20.7	19.8	21.6	26.5
	Total	100.0	100.0	100.0	100.0	100. 0	100.0	100.0	100.0	100.0	100.0
1932**	Advertising	9.5	10.2	11.6	13.1	12.7	13.2	15.6	15.2	13.0	11.3
	Pay roll	73.1	71.9	69.0	69.7	67.4	71.5	63.0	63.1	63.8	62.3
	Real estate	17.4	17.9	19.4	17.2	19.9	15.3	21.4	21.7	23.2	26.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1931††	Advertising	10.5	11.1	11.3	13.3	14.3	14.5	14.0	15.8	13.5	.....
	Pay roll	73.4	73.1	70.9	72.6	68.5	69.4	71.0	65.6	66.2	.....
	Real estate	16.1	15.8	17.8	14.1	17.2	16.1	15.0	18.6	20.3	.....
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.....
1930‡‡	Advertising	10.5	10.8	11.1	11.3	13.4	13.9	14.0	15.4	13.6	.....
	Pay roll	74.6	74.9	74.0	72.4	70.8	71.0	69.6	67.3	68.3	.....
	Real estate	14.9	14.3	14.9	16.3	15.8	15.1	16.4	17.3	18.1	.....
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.....

‖ *Ibid.*, No. 96, p. 7.
¶ *Ibid.*, No. 92, pp. 16, 20, 26.
** *Ibid.*, No. 91, p. 2.
†† *Ibid.*, No. 88, p. 2.
‡‡ *Ibid.*, No. 85, p. 6.

one, nor does it vary in a random manner. It progresses steadily upward to the sales-volume group $4,000,000–$10,000,000 and then turns downward.[9] Apparently, other factors are at work which are not included in the hypothesis, such as the tendency for stores with high volumes to be located in trading areas where, because of higher incomes, the buyers may be more sensitive to location than they are to price or advertising. Factors arising from differences in the effectiveness of advertising because of differences in media, differences in appeal, and other qualitative differences should tend to cause random variations unless such differences are highly correlated with the size of store.

Furthermore, a perfect relationship should not be expected, for the theory implies that the effect of advertising is continuous over an infinite range, whereas in reality there is a certain minimum amount that can successfully be spent on advertising, and there is a definite limit to the expansion of advertising in terms of the number of new buyers that can be reached. This situtation constitutes a limitation to the original hypothesis, but the seriousness of the limitation depends on the particular field studied. In department-store advertising expansion can be carried on by increasing the number of products featured, so that the upper limit, while present, may have little effect on the relation of advertising to sales. For industrial advertising, dealing with a limited number of products in a small market, the influence of the upper limit is quite apparent.[10] The existence of the upper limit may explain the

[9] Cf. Elizabeth A. Burnham, "The Influence of Size of Business on Department Store Operating Results," *Harvard Business Review*, XVI, No. 2 (1937), 211.

[10] The following tabulation, taken from *A National Survey of Industrial Advertising Budgets for 1939* (Chicago: National Industrial Advertisers Association, Inc., 1939), p. 7, gives the percentage of gross sales spent for industrial advertising arranged by size of company:

Annual Sales Volume	1935		1936		1937		1938		1939*	
	No. of Co.'s	%	No. of Co.'s	%	No. of Co.'s	%	No. of Co.'s	%	No. of Co.'s	%
Less than $200,000	30	4.09	33	4.39	38	4.78	43	4.25	40	4.24
$200,000–$500,000	39	2.92	43	3.23	54	3.09	60	3.22	59	3.10
$500,000–$1,000,000	28	2.75	32	2.29	38	2.35	42	2.46	44	2.58
$1,000,000–$2,000,000	32	1.95	37	1.88	36	1.80	44	2.36	41	2.35
$2,000,000–$5,000,000	43	1.85	42	1.65	43	1.72	51	1.96	51	1.83
Over $5,000,000	44	1.09	45	0.98	46	1.06	49	1.16	51	1.19

* Estimated.

downturn after the $4,000,000–$10,000,000 sales-volume group, but it does not explain the gradual rise to that point.

If we choose to look at the figures in Table 1 as they vary through time rather than as they vary between sales-volume groups, we find that the variation is quite small. The major changes occur in sales-volume groups $500,000–$750,000 and $750,000–$1,000,000, and the maximum change is from 11.1 per cent to 13.7 per cent. These particular variations may represent the adjustment by store managements to the figures as published by the Harvard Bureau of Business Research, particularly since all reporting stores receive the reports, and as such represent the correction of imperfections existing prior to the report. More striking is the fact that the general uniformity of the figures occurred over a time period that saw marked changes in wage rates and advertising costs, both absolutely and in relation to one another. This, of course, may be due to inertia on the part of department-store managers to adjust themselves to change, but in view of the length of the period under observation more probably represents a tendency for the relation of advertising to other selling expenses to remain constant in spite of changes in the relative costs of the various methods of securing sales volume.

A strict interpretation of our hypothesis would lead us to expect uniformity of advertising as a percentage of sales between sales-volume groups. Such a relationship does not hold and indicates that a modification of the hypothesis may be in order. On the other hand, stability through time tends to confirm a major deduction from the hypothesis, though further study is required to substantiate this point.

To test the second and third relationships mentioned above, information was obtained on the sales and advertising expenses of 108 department stores for the year 1935.[11] The original sales fig-

[11] These 108 stores are all of the reporting department stores located in cities of 50,000 population or more, except those belonging to complex trading areas such as New York and Chicago where fortuitous influences are at work to such an extent that they make comparisons of these areas and other trading areas difficult. Furthermore, the data are for single stores; no branch data are included. Ninety-four of the 108 stores covered had leased departments. Sales of leased departments and advertising expenses of these departments have been excluded. No department stores

ures were converted to a per capita basis and corrected for differences in buying power. The original advertising expenses were also reduced to a per capita basis and were corrected for differences in advertising costs. These corrections were necessary before the data could be released.

The correction for population was based on the Bureau of Census population figures for the trading areas when available, and the *Editor and Publisher* reports when census figures were not given. A rough measure of buying power was obtained by the construction of a simple relative index based on total retail sales in the various areas as reported in the 1935 *Census of Distribution*. The population figures were 1930 federal census data, as no reliable estimates were available for 1935. Advertising expenses were corrected by an index of advertising costs based on a weighted arithmetic mean milline rate in each area; the milline rate as reported in the *Standard Rate and Data Book* for 1935 was weighted by the number of lines of department-store advertising as reported in *Media Records* for 1935. Each store falls into one of five sales-volume groups, which are: (1) less than $500,000; (2) $500,000–$2,000,000; (3) $2,000,000–$4,000,000; (4) $4,000,000–$10,000,000; (5) $10,000,000 and over. Furthermore, each store belongs to one of the following trading area groups: (1) less than 150,000; (2) 150,000–250,000; (3) 250,000–500,000; (4) 500,000–1,000,000; (5) 1,000,000 and over.

TEST II. *Is there a tendency for extreme variation in advertising as a percentage of sales to be associated with low sales?*—The tendency for high sales to be associated with the "proper" proportion of advertising expense to total expense, and low sales with ex-

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were included if their leased department sales amounted to 15 per cent of total sales.

Advertising expenses include the cost of space purchased in all newspapers and in shopping news; the cost of all printed matter and periodicals which are mailed direct to customers, inclosed in customers' packages, or distributed from house to house; cost of space purchased in magazines, programs, streetcars, and billboards; the net cost, exclusive of pay roll, of operating broadcasting stations owned by the store, and the total cost of broadcasting through outside stations; and expense incurred for merchandise shows, style shows and openings, and special features.

treme variations from the "proper" amount can be expressed in terms of a scatter diagram of the type indicated in Figure 1.[12] The scatter indicated takes into consideration not only differences in the quality of the advertising, minor differences in competitive conditions, imperfection in the occupancy charges, and other factors, but the possibility that the other selling expenses may not be

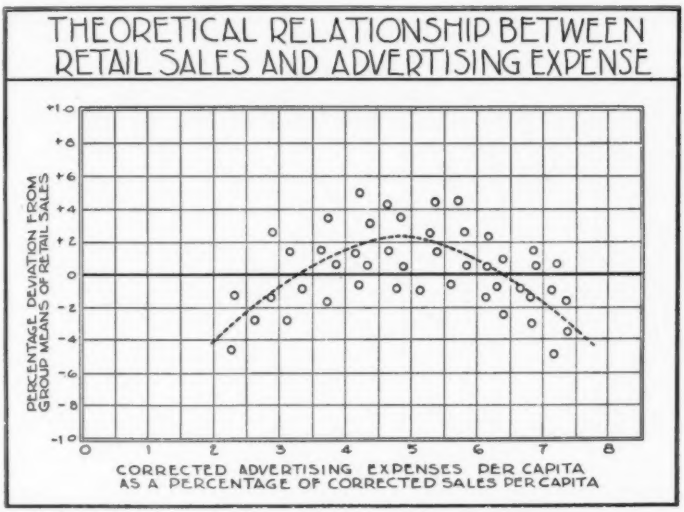

FIG. 1

properly apportioned. In spite of these imperfections, the general appearance of the scatter should be that of an inverted U, indicating a maximum sales result at the "proper" ratio of advertising expense to sales, with lower sales results if too much or too little of a given sales expense is appropriated to advertising.

It was impossible to adjust the data to fit the hypothetical case exactly. However, estimated percentages of advertising to sales were obtained by dividing corrected per capita advertising expense by corrected per capita sales; and to minimize the influence of different amounts of selling expense, the corrected per capita

[12] The authors wish to thank Mr. H. T. Malchesky for the construction of the diagrams.

sales were expressed as deviations from the arithmetic mean of the per capita sales for each trading-area–sales-volume group. The result for trading areas 4 and 5 is shown in Figure 2. The heavy lines shown on the scatter diagram represent straight-line and parabolic functions that were fitted to the data after eliminating the unusual cases which are indicated by black dots. It is

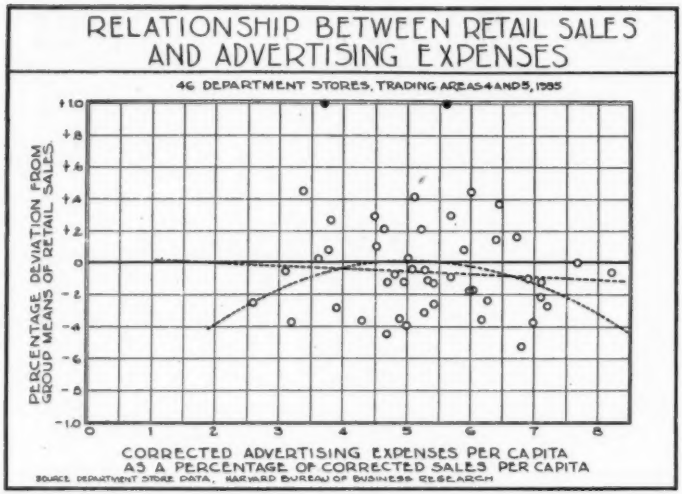

FIG. 2

clear that for trading areas 4 and 5 there does exist a marked curvilinear tendency of the type required by the hypothesis.

A scatter diagram was also constructed for trading areas 1, 2, and 3. There was a marked scatter with a slight degree of curvilinearity of the type expected. It may be that competitive conditions in trading areas 1, 2, and 3 are too diverse to permit the true relationship to show fully or that the correction factors applied to the original data have introduced substantial errors. It is also possible that the original hypothesis may not be complete and that the relationship found for trading areas 4 and 5 is due to other causes.

The visual results as reported above are mathematically sub-

stantiated by the *F*-test for curvilinearity. Briefly, the *F*-test as used in this study determines the approximate probability that the curvilinearity in the data is one arising from chance and would occur, say, once in a number of times even if the relationship in the universe were *linear*. If the curvilinearity could be easily attributable to chance, then a parabolic function of the type $Y = A + BX + CX^2$, in comparison to the straight line $Y =$

TABLE 2

F-TEST FOR CURVILINEARITY FOR STORES IN TRADING AREAS 4 AND 5

Function	Source of Variation	(A) Amount of Variation (Σd^2)	(B) Degrees of Freedom	(A÷B) Variance
$Y_c = 0.032197 - 0.017697X$ (origin at zero)	Explained by straight line	0.023090	1	0.023090
	Increment due to additional constant	0.388201	1	0.388201
$Y_c = -1.01671 + 0.39931X - 0.039108X^2$ (origin at zero)	Total explained by second-degree curve	0.411291	2	0.2056455
	Unexplained by second-degree curve	2.478714	43	0.057644
	Total	2.890005	45	0.064445

$$F = \frac{0.388201}{0.057644} = 6.75$$

5 Per Cent Level of Significance	1 Per Cent Level of Significance
$n_1 = 1$ and $n_2 = 45$; $F = 4.06$	$n_1 = 1$ and $n_2 = 40$; $F = 7.31$
$n_1 = 1$ and $n_2 = 40$; $F = 4.08$	$n_1 = 1$ and $n_2 = 45$; $F = 7.23$

$A + BX$, would, by the additional constant, explain an amount of variation in the dependent variable which would not be significant in terms of the remaining unexplained variance per degree of freedom.

The functions fitted for trading areas 4 and 5 as a group and trading areas 1, 2, and 3 as a group, and the application of the *F*-test, are presented in Tables 2 and 3, respectively.

From Table 2 it is apparent that for trading areas 4 and 5 the 5 per cent level of significance is more than met, but the 1 per

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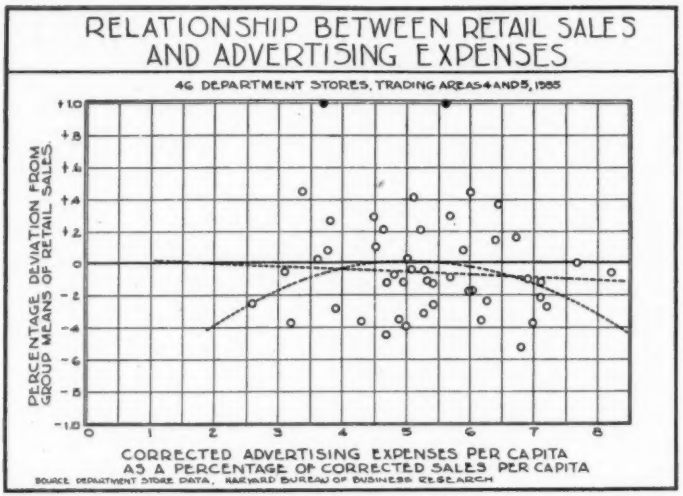

FIG. 2

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$$F = \frac{0.388201}{0.057644} = 6.75$$

5 Per Cent Level of Significance	1 Per Cent Level of Significance
$n_1 = 1$ and $n_2 = 45$; $F = 4.06$	$n_1 = 1$ and $n_2 = 40$; $F = 7.31$
$n_1 = 1$ and $n_2 = 40$; $F = 4.08$	$n_1 = 1$ and $n_2 = 45$; $F = 7.23$

$A + BX$, would, by the additional constant, explain an amount of variation in the dependent variable which would not be significant in terms of the remaining unexplained variance per degree of freedom.

The functions fitted for trading areas 4 and 5 as a group and trading areas 1, 2, and 3 as a group, and the application of the *F*-test, are presented in Tables 2 and 3, respectively.

From Table 2 it is apparent that for trading areas 4 and 5 the 5 per cent level of significance is more than met, but the 1 per

cent level of significance is not quite achieved. This means that the odds are approximately 1 in 20 that such a decrease in variance by the additional constant of the parabola would arise from chance if in the universe the relationship were truly linear.

This test adds to our previous graphic presentation and increases our confidence that for trading areas 4 and 5 there does exist a curvilinear tendency of the type required. It must be remembered that no attempt is being made to establish the curves presented as the "true" mathematical relationships. The second-degree curve was used because it was the simplest function which represented the curvilinearity required; i.e., an inverted U.

TABLE 3

F-TEST FOR CURVILINEARITY FOR STORES IN TRADING AREAS 1, 2, AND 3

Function	Source of Variation	(A) Amount of Variation (Σd^2)	(B) Degrees of Freedom	(A÷B) Variance
$Y_c = -0.026473 - 0.008806X$ (origin at zero)	Explained by straight line	0.00621	1	0.00621
	Explained by additional constant of parabola	0.00136	1	0.00136
$Y_c = -0.086818 + 0.022968X - 0.003746X^2$ (origin at zero)	Total explained by parabola	0.00757	2	0.00379
	Unexplained by parabola	1.99581	42	0.04752
	Total	2.00338	44	0.04553

$$F = \frac{0.00136}{0.04752} = 0.028$$

5 Per Cent Level of Significance

$n_1 = 1;\ n_2 = 40;\ F = 4.08$

$n_1 = 1;\ n_2 = 45;\ F = 4.06$

From Table 3 it is readily apparent that such a degree of curvilinearity may be due to chance variation and could easily occur if the relationship in the universe were linear. This test does not absolutely deny the possible existence of curvilinearity in trading areas 1, 2, and 3, but it does bring out the fact that the curvi-

linearity observed in the data is not sufficiently unusual to support the original hypothesis.

TEST III. *Is there evidence of diminishing returns from advertising?*—The usual procedure in the study of diminishing returns is to compare advertising and sales figures for an individual concern over a period of time. This approach is logically sound if the variations in sales can be traced to advertising, eliminating the influence of factors such as changes in buying power, changes in competition, variations in the quality of management, and other similar influences. Moreover, it is difficult if not impossible for the outside investigator to procure the data for an individual concern.

Some light on the relationship of sales and advertising, as pointed out in Section I, may be secured by a study of a cross-section of concerns at a point in time. Such information can be more easily obtained. This approach substitutes the changes that occur from one geographic area to another for the changes that occur from one time period to another. To the extent that advertising has a cumulative effect, comparisons of time periods are particularly difficult; the cross-section approach tends to minimize this problem, although it does not eliminate it entirely.

In this study, although data are available on the sales and advertising of a number of stores for a given time period, the differences between the stores in terms of location, competition, price lines, and other factors influencing sales are so great as to prevent the differences caused by advertising to be observed, should there be any. True, there is a high degree of correlation between sales and advertising in the data, but the authors feel that this is not a cause-and-effect relationship but in large part a spurious correlation arising from outside factors such as those just mentioned.

III. SUMMARY AND CONCLUSIONS

1. Advertising as a percentage of selected selling expenses varies from approximately 9 per cent to 15 per cent between sales-volume groups in the years studied. Through time, however, the variation for any one sales-volume group was quite small.

2. For trading areas 4 and 5 there was a definite tendency for

sales results to reach a maximum and then decline as the ratio of advertising expenses to sales increased.

3. There was no definite tendency for maximum sales results to occur at any ratio of advertising expense to sales in trading areas 1, 2, and 3 taken together.

4. The influence of outside factors in these data invalidated any attempt to determine whether or not there were diminishing sales returns from additional advertising expenditures.

These findings indicate in a general way that the relationship between sales and advertising is describable by a function homogeneous in the first degree. They show, however, that at several points substantial modifications of the theory may be necessary. More complete information on physical amounts of selling and advertising efforts, advertising and selling costs, competitive conditions, and other relevant factors, would permit a more thorough study and might lead to a more definite evaluation of the hypothesis concerning the relation of advertising and other selling expenses to sales.

DIRECT-MAIL ADVERTISING TO DOCTORS[1]

JOHN E. JEUCK[2]

INTRODUCTION

THIS study was undertaken in the hope of discovering certain facts relevant to the choice of a more nearly scientific basis for dividing pharmaceutical advertising appropriations between direct mail and other media. It has been customary to allocate something more than half of the total advertising budget to direct mail, but the belief that use of mailing pieces has increased has led advertisers to inquire whether the advertising dollar may not be spent more advantageously—whether perhaps the basis of allocating the appropriation should be changed.

It is not the purpose of this paper to set forth a formula for achieving an optimum expenditure of the advertising budget. It would be presumptuous to attempt such a program in view of the great gaps in our knowledge of the advertising process. This study represents a first step toward obtaining information which it is hoped may eventually make possible the formulation of an optimum plan of expenditures. The research is primarily directed toward the discovery of certain facts basic to a more rational program of pharmaceutical advertising expenditures—such facts as the average number of pieces of advertising literature a doctor receives per week, the variation between weeks, the amount of mail opened, some measure of how much mail is read, and the comparative status of the journals and controlled-circulation publications in terms of reader interest and advertising effectiveness.

Two basic methods of investigation were used in the conduct of the study. The first involved the distribution of large envelopes

[1] This study was made possible by funds made available by Murray Breese Associates, Inc. The author wishes to thank them for extending the original grant in order that the study might be completed. The advice and guidance of the faculty of the School of Business are gratefully acknowledged, particularly that of Mr. George H. Brown, under whose immediate supervision the work was done.

[2] Mr. Jeuck held the Murray Breese Associates Research Fellowship in the School of Business of the University of Chicago during the year 1938–39.

to a random list of doctors having offices in Chicago. Each doctor was asked to accumulate the advertising literature he received during a specified week and place it in the envelope left with him. At the end of the period the envelope was picked up, and the contents classified and tabulated.

Before any attempt was made to survey doctors on a city-wide scale, a preliminary study was carried out among doctors at Billings Hospital. Letters were sent to all the doctors on the staff as listed in the hospital directory asking their co-operation in the study. Those doctors willing to co-operate returned a form provided for that purpose. The time covered was four weeks—from February 20 to March 18, 1939.

Doctors expressing a willingness to aid in the study then received a large manila envelope and a letter of instruction in which they were asked to collect a week's accumulation of advertising mail in the large envelope and send it to us through the University post office. Upon receipt of these envelopes, the contents were classified into opened and unopened advertising mail.[3] Postal cards were not tabulated in this preliminary study because there were practically none returned, most postal cards having been eliminated at the central desk before the mail was distributed to the doctors. The mail received was sorted into three groups pharmaceutical, miscellaneous medical, and miscellaneous extraneous mail.

The purpose of the Billings study was primarily to bring into focus the problems which might be met in a larger study of a similar kind and to bring to light certain classifications that might be useful in such a study. A secondary objective was to find out something of the habits and attitudes of doctors in teaching and research institutions. Wherever such information appears pertinent, it has been utilized in the main body of the discussion which follows.

Besides the empirical analysis of the envelopes received from the 65 doctors at the hospital, approximately 30 of these doctors were interviewed in an effort to corroborate the results of the

[3] In the following discussion the term "mail" is used in all cases to refer to advertising mail only.

envelope analysis and to gather certain information not possible to gain from a study of the envelopes returned. The questionnaire used in the larger study was based upon questions used in the interviews at the hospital.

In the city-wide survey which followed this preliminary survey the method of random sampling was employed. A somewhat different technique was employed in the selection of the sample.

The city was divided into areas, and then certain sections believed to be characteristic of the whole section were blocked out, and a random sample taken in these blocked-out portions.[4] It was planned to contact by letter approximately 300 doctors in each of these areas. The *Chicago Medical Blue Book*, which lists all Chicago physicians and surgeons, was used as the basis for the mailing lists. All the addresses coming within the blocked-out areas were first checked, and then a random sample was taken from this list. For instance, if there were 900 doctors included in the section selected to represent the South Side of the city, every third name was taken, resulting in a total of 300 doctors to be contacted in that area. Letters were then mailed to these doctors asking their co-operation in the study. If the doctor was willing to co-operate, he filled out the form at the bottom of the letter and returned it in the self-addressed, permit return envelope provided for that purpose. When the doctors' replies were received, large envelopes and instructions were either mailed or delivered to their offices, and at the end of the week specified these envelopes were collected and tabulated by us.

The city-wide survey covered a period of five weeks—from May 8 to June 10, 1939. The total number of doctors represented in this study was 208. It is to be noted that the method of inquiry pursued is relatively expensive, but it was felt that it assured a maximum freedom from bias and provided a highly reliable index of the amount of mail received. Doctors were not informed about what we hoped to find out from the contents of the envelopes. They were not told that the mail was to be classified into opened

[4] Areas were selected in such a way that the major characteristics of the city were represented.

and unopened or that we were trying to find out how much mail they received.

While this method allows for the desired degree of objectivity in the data, its chief weakness lies in the lack of control it is possible for the investigator to exert. There is no guaranty that the doctor in each case allowed all his advertising mail to accumulate or that the accumulation was confined to only one week's time. Certain exigencies which arose in connection with the collection of the envelopes emphasize especially the latter hazard.[5]

In tabulating the contents of the envelopes it was relatively easy to tell whether a mailing piece had been opened. As already indicated, the doctors co-operating in the study were not told why we were interested in the advertising mail. They were asked merely to handle their advertising literature in their habitual ways but, instead of discarding it, to allow it to accumulate for a period of one week.

Instead of following up the envelope method with interviewing, a questionnaire was mailed to approximately 1,200 doctors. The questionnaire was an attempt to get at certain facts impossible to bring out merely by use of the envelopes. Here again the method of random sampling was employed. The directory lists some 6,000 doctors in Chicago, and the mailing list was made up of every seventh name without regard to location in the city. It should be noted that all the doctors included in the envelope sampling were also included in the mailing of the questionnaires, bringing the total to 1,058. The questionnaire sample was an over-all city sample. About 50 per cent of the questionnaires were returned, of which over 400 were used in the final tabulation.

The study has been confined to practicing regular physicians and surgeons of the white race listed in the *Chicago Medical Blue Book*.[6] The area covered is Chicago. Doctors having offices in Chicago were included in the study regardless of the residential address. All in all, information was secured from 637 doctors in the city-wide study.

[5] Cases involving obvious error were, of course, eliminated from the tabulations.

[6] The *Chicago Medical Blue Book Directory* distinguishes between "regular" doctors and homeopathic, eclectic, and physiomedical.

In the statistical manipulation of the tabulation results percentages and simple averages have been used exclusively. It is possible to employ statistical techniques which would result in a more refined analysis, but it was believed that there was little to be gained in the present case.

The material in the discussion which follows summarizes but a small part of all the tabulations made. The data were subjected to cross-classifications of several sorts including breakdowns by sex, economic status, particular fields of special practice, etc. The results of these tabulations have been omitted from the report as presented here, either because the number included in the classifications was too small or because it was felt that the basis for the classification was not sound.

AMOUNT OF ADVERTISING MAIL RECEIVED

For the entire group of doctors from whom envelopes were used, the average number of pieces of all advertising mail received during a week was 23.1, approximately 4 pieces per day. This figure includes postal card advertisements as well as sealed and unsealed envelope mail. Of all the advertising mail received, postal cards amounted to slightly less than 15 per cent. Since it was impossible to tell whether or not postal cards received any attention at all, they have been omitted from the discussion which follows.

Doctors included in the study received an average of 19.7 pieces of advertising literature a week, excluding postal cards, of which some 14 pieces were of a pharmaceutical nature, 3 pieces of a miscellaneous medical[7] character, and the remainder were classified as extraneous—assorted nonmedical literature.

One should not depend too much upon the average as an indication of the amount of advertising mail received; some doctors received considerably less than the average, and some doctors, of course, received more. The range in this particular case was from 3 pieces per week at one extreme to 44 pieces a week, at the other extreme. It can be seen from the figures in Table 1 that 58 doctors or about 25 per cent of those included in the study, received but

[7] This classification includes medical book advertisements and all nonpharmaceutical literature of a general medical character.

14 pieces or less per week; 108, or slightly more than one-half of the doctors, received 19 pieces or less per week. Only 55 doctors, about 25 per cent, receive 25 or more pieces of advertising literature per week, and only 27 doctors, or less than 15 per cent, receive as much as 30 or more advertising mail pieces per week.

In the study of doctors at Billings Hospital the average is still less—only 13.4 pieces of advertising literature per week. The range in this group was between 2 and 34 pieces in a week. The

TABLE 1*

MAIL RECEIVED BY CHICAGO DOCTORS

No. of Pieces per Week	No. of Doctors
0– 4	3
5– 9	16
10–14	39
15–19	50
20–24	45
25–29	28
30–34	18
35–39	8
40–44	1
All cases	208

* This distribution includes envelope mail only. Postal cards raise total number of mail pieces received about 15 per cent.

concentration of cases at the lower limits of the curve is even more marked in this instance than in the city-wide survey. The figures in Table 2 indicate that 36 doctors, more than 50 per cent, received 14 pieces or less per week, and 57 doctors, or about 88 per cent, received less than 20 pieces of advertising mail per week. Only 12 per cent of the doctors in the group received as much as 20 or more pieces per week, and of this group only 1 received as many as 34 pieces. It is to be observed that while the arithmetic mean for the group was only 13.4, the modal interval is higher—15 to 19 pieces.

Certainly these are figures lower than one would expect to find. The prevailing opinion is that doctors receive a great deal more advertising mail than these figures indicate. It has been stated that counts have been made which run as high as 600 pieces per

doctor per month, approximately 150 pieces per week. Not a single case was encountered in this study in which such a figure was even approximated. There is, of course, always the possibility that an unrepresentative period was selected in which to carry on the study. However, the fact that the figures used are the results of studies conducted at two different times, each of a minimum of four weeks' duration and each made at quite different seasons of the year, tends to minimize the danger of having chosen an atypical period. There is also the possibility that the doctors in the sample may not be representative of the universe. There is nothing about the group of doctors included in the sample, however, which would lead one to believe that the sample is biased in any particular direction.

TABLE 2

ADVERTISING MAIL RECEIVED BY DOCTORS AT BILLINGS HOSPITAL

No. of Pieces per Week	No. of Doctors
0– 4	2
5– 9	17
10–14	17
15–19	21
20–24	5
25–29	2
30–34	1
Total cases	65

It is not to be inferred that the average number of pieces of mail received by doctors is constant at all times. In the city-wide survey the average number of pieces for the lowest week was approximately 16 (15.79)—8 pieces less than the week with the highest average of about 24 pieces (24.21). Practically all doctors interviewed stated that there was considerable variation from week to week. Whether there is any pattern to this variation is not evident from the data.

In addition to the weekly variation there is also a seasonal variation. According to the statements of doctors interviewed, more mail is received during the fall and spring seasons, and it is well

known among advertising men that the summer season brings a reduction in the quantity of advertising placed.

AMOUNT OF ADVERTISING MAIL OPENED

In the city-wide survey 83 per cent of all the advertising mail received by doctors was opened, or something more than 16 pieces of the average 20 received. There appear to be no marked differences in the propensity of doctors to open pharmaceutical mail, miscellaneous medical mail, or miscellaneous extraneous mail. As shown in Table 3, the maximum range of difference is but slightly more than 3 per cent.

TABLE 3

MAIL OPENED (BY CLASS)

Class of Mail	Per Cent Opened
Pharmaceutical	82.35
Miscellaneous medical	85.37
Total medical	82.88
Miscellaneous extraneous	81.99
All mail	82.78

In contrast to the relatively slight differences indicated in the number of pieces of mail of different types opened among practicing physicians throughout the city are the comparable figures in Table 4 for the Billings Hospital doctors which show a definite

TABLE 4

MAIL OPENED (BY CLASS) AT BILLINGS HOSPITAL

Class of Mail	Per Cent Opened
Pharmaceutical	68.25
Miscellaneous medical	77.57
Total medical	70.96
Miscellaneous extraneous	85.70
All mail	72.07

tendency for these doctors to favor advertising mail of a nonpharmaceutical nature. This is to be explained largely in terms of the interest these doctors have in advertisements of medical publications, announcements of meetings, general book advertisements,

and, especially in the case of miscellaneous extraneous mail, in the fact that it is not always easy to identify nonmedical mailing pieces as advertisements merely by glancing at the envelope.

General practitioners opened more of their mail than did specialists. The former group opened 84 per cent of their mail, while the latter group opened but 79 per cent. In line with these figures are the results of the preliminary survey at the hospital, in which

TABLE 5

PERCENTAGE OF DOCTORS HAVING ONE OR MORE ASSISTANTS

Classification	Total Doctors Reporting	Doctors with Assistants	Per Cent
Not affiliated with medical schools	376	175	46.5
Affiliated with medical schools	58	40	69.0
General practitioners	341	139	40.8
Specialists	93	76	81.7
All doctors	434	215	49.5

TABLE 6

PERCENTAGE OF CASES WHERE ASSISTANTS OPEN ADVERTISING MAIL

Classification	Doctors with Assistants	Assistants Open Mail	Per Cent
Not affiliated with medical schools	175	65	37.2
Affiliated with medical schools	40	17	42.5
General practitioners	139	56	40.3
Specialists	76	26	34.2
All doctors	215	82	38.1

all doctors are highly specialized. The percentage of advertising mail opened by this group was the lowest of all—72 per cent.

The results of the questionnaire indicate, too, that the great bulk of advertising mail is opened, either by assistants or personally by the doctor. About one-half of the doctors included in the study employ one or more assistants. Of this group slightly more than one-third (38.1 per cent) allow their assistants to open business letters, but 79 per cent of the doctors having assistants see all their advertising mail before it is disposed of. Only 21 per

cent of those answering say that their assistants eliminate some mail, and only one doctor states that all advertising mail is thrown away without any inspection.

More than half the doctors included in the study state that they open all their advertising mail personally. For the most part the assistants whose duties include the opening of mail also probably open all the advertising mail addressed to their employers so that all advertising mail is opened in about 71 per cent of the cases. The discrepancy between this figure and that of the envelope analysis is due to those doctors who personally open only a part of their mail, for among doctors who do not themselves open all their advertising mail, 52.6 per cent open half or more of their advertising mail. It appears safe to say that a minimum of 80 per cent of the advertising mail received is opened.

Answers to the questionnaires indicate that general practitioners personally open all their mail more frequently than do specialists, owing probably to the greater number of assistants among the latter group, as there appears to be no difference between the two groups in regard to inspection of their mail before it is disposed of. A greater difference is to be observed, however, in the case of doctors affiliated with medical schools. Of these doctors 28 per cent admit that some of their mail is thrown away without inspection, while this practice is followed by only 19 per cent of the doctors not so affiliated. Similarly, 33 per cent of the former group who do not open all their mail claim to open less than 10 per cent, while among the latter group only 20 per cent of the doctors open less than 10 per cent of the advertising mail they receive. This is to be accounted for primarily by the fact that assistants open advertising mail more frequently among this group. However, too much importance should not be placed on these differences which appear from tabulation of the questionnaires, since in the tabulation of the mailing pieces collected from physicians there was a difference of only 4 per cent in favor of doctors without medical school affiliations. In the latter case 84 per cent of the mail was opened, while 80 per cent of the mail was opened among doctors with school affiliations.

It is readily apparent that most of the advertising mail received

by doctors is opened, contrary to the casual observations frequently made among members of the profession. Probably the reason for this general opening of mail lies in habit. Although tabulations were not made on this particular fact, it was observed in tabulating the contents of the envelopes that in most cases all pieces of mail in a given envelope were either opened or unopened. There appears to be some but not a great deal of selectivity exercised in the opening of advertising mail. However, in so far as the

TABLE 7

DOCTORS' INSPECTION OF MAIL OPENED BY ASSISTANTS

CLASSIFICATION	INSPECT ALL MAIL		INSPECT SOME OF THE MAIL		INSPECT NO MAIL		TOTAL DOCTORS REPORTING*	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Not affiliated with medical school	136	80.0	33	19.4	1	0.6	170	100
Affiliated with medical school	28	71.8	28	28.2	0	.0	39	100
General practitioners	107	78.1	29	21.2	1	.7	137	100
Specialists	57	79.2	15	20.8	0	0.0	72	100
All doctors	164	78.5	44	21.0	1	0.5	209	100

* Not all doctors reporting assistants opening mail gave information on this point.

opening of mail is a function of purposeful selection, the questionnaire attempted to find out what some of the important factors are in this process of selection.

Of the five factors related to selectivity listed on the questionnaires, the source of the advertisement appeared to be most important, i.e., the manufacturer responsible for the mailing piece. This factor accounted for about 28 per cent (27.6) of the total count. Next in frequency was whether the material was of interest in the doctor's special field, which accounted for 26 per cent of the total. House organs followed in importance, accounting for 23 per cent of the total. These three factors appear to be most important in a rational decision to open mail advertising. Sample inclosures are apparently less important than one might expect,

appearing to be of significant influence in only 14 per cent of the cases. Finally, failure to recognize as advertising was checked 49 times, or 9.5 per cent of the total count. It is interesting to note that several doctors replied that they opened all their advertising mail because they had thrown away checks coming from patients who had sent remittances in envelopes of pharmaceutical manufacturers.

TABLE 8*

FACTORS IMPORTANT IN THE OPENING OF MAIL

Factor	Doctors Not Affiliated with Medical Schools		Doctors Affiliated with Medical Schools		General Practitioners		Specialists		All Doctors	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Source	116	27.2	27	29.7	103	28.1	40	26.3	143	27.6
Specialty	106	24.8	28	30.8	88	24.0	46	30.3	134	25.9
House organ	103	24.1	17	18.7	88	24.0	32	21.1	120	23.2
Sample inclosed	60	14.1	12	13.2	54	14.8	18	11.8	72	13.9
No recognition†	42	9.8	7	7.7	33	9.0	16	10.5	49	9.5
Total	427	100.0	91	100.1	366	99.9	152	100.0	518	100.1

* This information was tabulated only for doctors who did not open all advertising mail.
† I.e., mail opened because it was not recognized as advertising.

THE READING OF ADVERTISING MAIL

The measurement of the amount of advertising mail opened is at best but a rough index of the value of direct-mail advertising. More important is the amount of attention such literature gets after opening. Information regarding this fact was sought through the questionnaire. In approximately 68 per cent of the cases all mail received some kind of inspection by the doctor.[8] To this should be added an unknown amount for those doctors who see "some" but not all of their mail.

Eleven per cent of those answering the questionnaire said that

[8] This figure is derived by adding to 53.7 per cent (percentage of doctors personally opening all mail) 79 per cent of 38.3 per cent of 49.5 per cent (doctors who see all mail opened by assistants, from Table 5, 6, and 7).

they read all their advertising mail, 87 per cent read some of it, and only 2 per cent claim to read none of the advertising mail they receive; so that 98 per cent of the doctors read at least some of their pharmaceutical advertising literature. General practitioners appear to read more of their advertising literature than do specialists. Of the former group 12 per cent replied that they read all their mail advertising as against 7.4 per cent so replying among specialists. Furthermore, 98.3 per cent of the general practitioners read some of their mail, while 95.7 per cent of the specialists read at least some of theirs. While few doctors replied that they

TABLE 9

AMOUNT OF MAIL READ BY DOCTORS

CLASSIFICATION	ALL		SOME		NONE		TOTAL	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Not affiliated with medical school	45	11.9	325	86.2	7	1.9	377	100
Affiliated	3	5.1	53	89.8	3	5.1	59	100
General practitioners	41	12.0	295	86.3	6	1.8	342	100
Specialists	7	7.4	83	88.3	4	4.3	94	100
All doctors	48	11.0	378	86.7	10	2.3	436	100

read no advertising mail, the incidence of this fact is slightly higher among specialists, being 1.8 per cent in the case of general practitioners and 4.3 per cent among specialists. It is to be expected, of course, that general practitioners, having a wider range of interest than specialists, would more frequently read all their advertising literature. The greatest difference appears to be between doctors affiliated with medical schools and those not so affiliated. Of the latter group 12 per cent read all their advertising mail as against only 5 per cent of the former group, but the difference is less between the two groups on the question of reading no mail at all. In 5 per cent of the cases doctors who have teaching or research affiliations claim to read no advertising mail as against 2 per cent of the other group answering in this way. It appears fairly certain from these figures that at least 95 per cent of the

doctors read at least some of the advertising literature that comes to their desks.

While the opening of mail may be largely a matter of habit, the reading of advertising literature is more readily traced to rational motives. Those answering the questionnaire were given a choice of six factors to check, which might affect their decision to read mail advertising. As in the case of opening mail, "source" again occurred most frequently as the reason for reading advertising, accounting for 24 per cent of the total count. This was followed

TABLE 10

FACTORS IN READING MAIL

Factor	Doctors Affiliated with Medical Schools		Doctors Not Affiliated with Medical Schools		General Practitioners		Specialists		All Doctors	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Source	40	28.2	208	23.4	198	23.9	50	24.5	248	24.0
Specialty	40	28.2	202	22.7	179	21.6	63	30.9	242	23.4
House organ	22	15.5	154	17.3	149	18.0	27	13.2	176	17.1
Editorial content	12	8.5	117	13.1	110	13.3	19	9.3	129	12.5
Time	18	12.7	144	16.2	126	15.2	36	17.6	162	15.7
Jokes	10	7.0	65	7.3	66	8.0	9	4.4	75	7.3
Total	142	100.1	890	100.0	828	100.0	204	99.9	1,032	100.0

closely by specialty interests (23.4 per cent), house organs (17.1 per cent), available time (15.7 per cent), editorial content (12.5 per cent), and finally jokes, which were responsible for 7.3 per cent of all tallies.

As between general practitioners and specialists, specialty interests were, of course, more important in the latter case, being mentioned more frequently even than source by this group—31 per cent of the total count as against 24.5 per cent of the count for "source." Among general practitioners source is most important. House organs are more important in the decisions of general practitioners than of specialists, accounting for 18 per cent of the count in the former groups and only 13 per cent in the latter group.

In the group of doctors affiliated with medical schools, source and specialty interests rank equally, each accounting for 28.2 per cent of the total. In the nonaffiliated group the relative standing of the factors listed is the same as for all doctors.

Another index of reader interest in advertising is the practice of filing advertising mail. In answer to the question regarding the filing of mail advertising literature, 36 per cent of those replying said that they frequently filed advertising mail, 46 per cent that they rarely filed mail, and 18 per cent that they never filed advertising mail. Specialists appear to file advertising less frequently than do general practitioners—replying that they never do in 24 per cent of the cases as against 16 per cent in the case of general practitioners. The difference is apparently even more pronounced between those affiliated with medical schools and others; 28 per cent of the former group replying that they never file advertising literature as against 16.4 per cent in the other group. Fifty-two per cent of the doctors in the Billings Hospital group stated that they never filed advertising literature. Too much emphasis should not be placed upon the percentages mentioned in the foregoing discussion because the matter of filing mail tends to reflect upon the care and thoroughness of the doctors reporting.

ADVERTISING IN MEDICAL PUBLICATIONS

In order to set up some basis of comparison between journal and direct-mail advertising for pharmaceutical products, questions were asked regarding the reading of the journals and journal advertising.

Table 11 lists the number of doctors who replied definitely that they did or did not regularly read particular publications. Doctors who did not specifically mark this question were omitted in the tabulation, but it should be noticed that if they had been included as nonreaders they would have lowered the readership of the special journals to 81.3 per cent and the controlled-circulation magazine to 78.3 per cent. In Table 12 is shown the number of doctors who specifically indicated that they did or did not notice the advertising in the various journals. Several doctors indicated observation or nonobservation of advertising and yet did not list

themselves as regular readers. It was assumed that these doctors were casual readers since otherwise they would have no basis for an opinion.

It can be seen that 81 per cent of the doctors replied that they regularly read the *Journal of the American Medical Association*. Seventy-nine per cent of all readers stated that they noticed the

TABLE 11

PERCENTAGE OF DOCTORS REGULARLY READING VARIOUS PUBLICATIONS

Classification	Journal of American Medical Association			Special Journals			Controlled Circulations*		
	No. of Doctors Replying	No. Reading	Per Cent	No. of Doctors Replying	No. Reading	Per Cent	No. of Doctors Replying	No. Reading	Per Cent
Not affiliated with medical schools	371	299	80.6	361	295	81.7	359	301	83.8
Affiliated with medical schools	58	50	86.2	59	55	93.2	57	36	63.2
General practitioners	336	266	79.2	328	261	79.6	327	286	89.5
Specialists	96	83	89.2	92	89	96.7	89	51	57.5
Members American Medical Association	329	285	86.6	324	279	86.1	321	255	79.4
Nonmembers	100	64	64.0	96	71	74.0	95	82	86.3
All doctors	429	349	81.4	420	350	83.3	416	339	81.0
Billings' doctors	30	22	73.3	28	28	100.0	29	14	48.3

* Magazines delivered free of charge to a "controlled" or selected list of doctors.

advertising in it. Naturally this journal is read more frequently by members of the American Medical Association than by nonmembers—87 per cent of those doctors who belong to the American Medical Association read the *Journal*, while it is read regularly by only 64 per cent of the nonmembers. While the *Journal of the American Medical Association* is read more frequently by both specialists and those affiliated with medical schools than by others, the advertising is reported to be noticed in more cases by general practitioners and by those not affiliated with medical schools, al-

though in the latter instance there appears to be very little difference between those teaching in medical schools and others.

Regarding the special journals 83 per cent of those replying say that they regularly read one or more of the special journals. The percentage is highest, as might be expected, among specialists—

TABLE 12

PERCENTAGE OF DOCTORS REPORTING THAT THEY NOTICED ADVERTISING IN VARIOUS PUBLICATIONS

Classification	Journal of American Medical Association			Special Journals			Controlled Circulations*		
	No. of Doctors Replying	No. Who Noticed Advertisement	Per Cent	No. of Doctors Replying	No. Who Noticed Advertisement	Per Cent	No. of Doctors Replying	No. Who Noticed Advertisement	Per Cent
Not affiliated with medical schools.	319	251	78.7	284	223	78.5	318	223	70.1
Affiliated with medical schools.	57	46	80.7	56	46	82.1	46	22	47.8
General practitioners.....	288	233	80.9	259	209	80.7	294	218	74.1
Specialists.....	88	64	62.7	81	60	74.1	70	27	38.6
Members American Medical Association.....	292	240	82.2	264	211	79.9	274	179	65.3
Nonmembers.....	84	57	67.9	76	58	76.6	90	66	73.2
All doctors...	376	297	79.0	340	269	79.1	364	245	67.3
Billings' doctors.....	.....	11	.....	9	.....	.....	.....	.....	.....

* Magazines delivered free of charge to a "controlled" or selected list of doctors.

97 per cent of them answering in the affirmative. Here again, however, in answer to the question, "Do you notice the advertising?" general practitioners answered yes in 80.7 per cent of the cases, while specialists answered affirmatively in only 74 per cent of the cases. In the case of teachers, special journals are read in 93.2 per cent of the cases. Other doctors read the special journals in only 81.7 per cent of the cases. Also the former group exceeds the latter in interest in special journal advertising, although the

difference is not so great, being 82.1 per cent in one instance and 78.5 per cent in the other.

Finally, there has been much speculation regarding reader interest in controlled-circulation publications. Reader interest in the magazine selected in this group is apparently as high among practicing physicians as that in the *Journal of the American Medical Association*. Eighty-one per cent of those answering replied that they read the magazine, and 67 per cent of those replying to the question acknowledged that they noticed the advertising in it. In contrast to these figures it was found in the study made at Billings Hospital that only 41 per cent of those interviewed admitted reading the publication and none of them noticed the advertising in it. In the city-wide survey, 63 per cent of those doctors affiliated with medical schools read the publications, and only 48 per cent of them reported noticing the advertising in it. The difference between general practitioners and specialists is even more marked. Of the former group 87.5 per cent replied that they noticed the advertising, whereas the percentage among specialists is much lower—57.3 per cent of the specialists replied that they read the publication, and about 39 per cent replied that they noticed the advertising.

However, one should hesitate to draw categorical conclusions about the value of controlled-circulation publications for pharmaceutical advertising from the foregoing data. The publication selected to represent the controlled-circulation group probably is not representative of the group as a whole. It is one of the three or four publications generally rated as the top-ranking periodicals of the controlled-circulation publications being circulated to the medical profession.

CONCLUSIONS

Casual observation leads one to believe that pharmaceutical advertising mail automatically gravitates to the waste basket. Such does not appear to be the case. The tabulation of the disposal of advertising mail indicates that the great majority of it is at least opened and inspected; and the results of the questionnaire lead one to conclude that at least some of it is read. It does not

appear to be true that the saturation point of direct-mail effectiveness has been reached. The amount of advertising mail received appears to be generally overestimated, and, judging from the amount of mail opened, there is apparently more than a casual interest in the contents of the advertising literature. The substantial number of doctors answering that they read at least some of their advertising mail supports this point, and it is further supported by the fact that approximately two-thirds of the doctors said that they did not resent the amount of advertising mail they received. The most significant variation from this is to be found among specialists where only slightly over half (53.8 per cent) said that they did not resent the amount of mail they received.

It is as yet impossible to measure accurately the effectiveness of advertising, and it is necessary to work on the basis of probabilities. While the results of this study indicate that the medium of direct mail is not yet outmoded, it does at the same time point to certain changes that might advantageously be made in the planning of pharmaceutical advertising budgets.

It seems evident from the facts discovered in this survey that noticeable differences exist between specialists and general practitioners, and between those affiliated with medical schools and others. The latter fact is buttressed by the results of the preliminary study made at Billings Hospital.

The hypothesis originally adopted in the conduct of this study was that physicians were interested in advertising to a degree more or less inversely proportional to their closeness to a functioning body of scientific knowledge. The closest approach to such a condition is to be found among doctors who are full-time members of research and teaching institutions. Certainly the "scientific attitude" cultivated in these institutions is not conducive to the most receptive attitude toward advertising. This is not to say that medical advertising is either unethical or unscientific, but it is merely a recognition that advertising is essentially partisan propaganda, and the essence of the scientific attitude is the attempt to keep an open and unbiased mind.

The evidence would seem to support the hypothesis at least in significant respects. The attitudes and practices of specialists are

substantially similar to those of teachers and research workers in the field of medicine. It is to be noted that there is some overlapping among the specialists and the teaching groups which has a tendency to make the results in the two groups similar. It is also true, however, that specialists have a narrower field of interest and like teachers have both more time and more opportunity for continuing contact with scientific advances as expounded in the scientific literature and meetings which the general practitioner does not find so readily at hand.[9]

All the evidence points to the general practitioners as the most receptive group for direct-mail advertising. This does not eliminate others from the mailing list, but it appears likely that the optimum effect would here be achieved by a selection of mailing lists that recognized specialty interests more completely than appears now to be the case. It is likely, too, that advertising products of particular interest to specific types of specialists would be more effective if the major attack came through journal media and "detail men," and the supplementing force via direct mail.

Another significant factor in determining the amount of attention paid to mail advertising is the source. The direct-mail medium apparently is not well suited to firms without an established reputation. The prestige of the journals is an aid in establishing respectability for an advertiser, and it appears probable that journal advertising enhances the value of direct advertising. Certainly there is some reciprocal influence between the two. The possibility of journal advertising may not be open to all manufacturers since the journals will not accept all advertising submitted, but it appears to the author that where possible the advertiser should take advantage of advertising through the journals as one means of implementing his prestige among physicians.

One thing does appear to be certain—wholesale mailing of samples is no guaranty of a successful direct-mail campaign. Sampling is thought by many to be among the most effective ways of stimulating attention for the mailing piece. The results of this study tend to emphasize the importance of other factors. Source

[9] Probably the longer period of formal training in the case of specialists is also a factor in the case.

and direction of advertising appear to be considerably more significant.

The house organ apparently is a successful means of getting the manufacturer's name before his audience. It ranks third as a factor in the decision of what advertising mail is to be opened. This method has many inherent advantages, not the least of which is the possibility of interesting format and features. The greatest disadvantage of using the house organ as a means of advertising is its expense, but in any advertising budget of appreciable size a house organ should receive serious consideration. It must be emphasized here, however, that general industrial experience with house organs is not completely reassuring, and it is possible that answers to the questionnaire were biased by the exceptional character of one or two of the house organs which circulate to the medical profession.

Subject to the qualifications mentioned in the main body of the discussion, controlled-circulation publications appear to merit a considerable amount of attention, expecially among general practitioners. This medium may present attractive possibilities particularly to the advertiser, an important part of whose market is to be found among general practitioners.

In conclusion, it can be stated rather definitely that as far as one can ascertain from the measurements used in this study direct-mail advertising is still an effective medium for pharmaceutical manufacturers. That the traditional proportion of an appropriation should continue to go to direct-mail advertising is not so clear. The decision appears to depend upon the nature of the product, the reputation of the manufacturer, and particularly the audience to which the advertising is directed. The journals have a wide circulation, and at least some controlled-circulation publications seem to be promising media.

The most effective use of direct mail demands a selective mailing list, and the presentation of the material in such a way as to appeal to the particular audience for which it is meant. On the whole, the general practitioner is the most promising audience for direct-mail advertising, and full-time research workers and teach-

ers in medical institutions the least promising; but there is no reason why an advertiser by use of intelligently prepared copy and selectivity cannot gain the interest of specialists and institutional workers.

It must be emphasized that this study has been confined to doctors in Chicago, and while the findings here may be typical of those in similar metropolitan centers, the results cannot be interpreted to apply to doctors in dissimilar locations. It is particularly true that one would probably find different practices and attitudes prevailing in rural areas. If the hypothesis accepted in this study is correct, one would expect rural audiences to be even more receptive to direct-mail advertising than are urban doctors.

A final word of caution must be added regarding the limitations of any data gathered by interview and questionnaire. These methods have the inherent limitation that the person replying may give answers reflecting what he thinks he should do rather than what he does. This applies with particular force in the case of questions regarding the reading of the scientific journals.

This study has by no means exhausted the work to be done in the measurement of the audience for direct-mail advertising. Various other classifications of groups might advantageously be made, but probably more important is the use of more refined techniques to measure advertising effectiveness. This represents but a beginning, and it is hoped that further investigation will bring to light other facts to facilitate a more scientific allocation of the advertising appropriation of advertisers of pharmaceutical products.

THE LOCATION OF THE SOUTH WATER WHOLESALE FRUIT AND VEGETABLE MARKET IN CHICAGO—*Continued**

E. A. DUDDY AND D. A. REVZAN†

CONSUMPTION OF FRUITS AND VEGETABLES BY COMMUNITY AREAS ACCORDING TO CONSUMERS' INCOMES

A FURTHER influence on market location is introduced by the factor of per capita and family income in relation to the amounts of fruits and vegetables consumed. Data were available for 1934 indicating the family and per capita income of the population in fifty-four community areas (see Table 13 and Fig. 6). From an analysis of the size of these incomes it was possible to classify these areas into low, low-average, high-average, and high groups. To each of these groups was assigned an allowance of fruits and vegetables classified as "restricted diets for emergency use," "adequate diets at minimum cost," "adequate diets at moderate cost," and "liberal diets."[44] The amounts specified were 295 pounds, 380 pounds, 565 pounds, and 725 pounds, respectively.

From these data it was possible to determine a theoretical consumption total for each community area by multiplying its population by the assigned dietary standard, i.e., according to income and adjusting for the effect of meals eaten in the Loop.[45] The

* The figure references of Tables 11 and 12 in the preceding instalment (*Journal of Business of the University of Chicago*, XII [October, 1939], 407 and 409) are in error. They should both make reference to Figure 5. Tables, figures, and footnotes in this and a concluding instalment continue the numbering from the first two articles.

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[44] Hazel K. Stiebling and Medora M. Ward, *Diets at Four Levels of Nutritive Content and Cost* (U.S. Department of Agriculture Circ. 296 [Washington, November, 1933], pp. 12–13).

[45] It was estimated that 800,000 persons in the fifty-three areas outside the Loop ate at least one meal in the Loop. Further, it was assumed that these 800,000 were distributed among each district in relation to that area's share of the total population. One-third of the dietary standard of fruits and vegetables was attributed to each area's share of the 800,000, and the accumulated poundage was subtracted from the area total and added to the Loop figure.

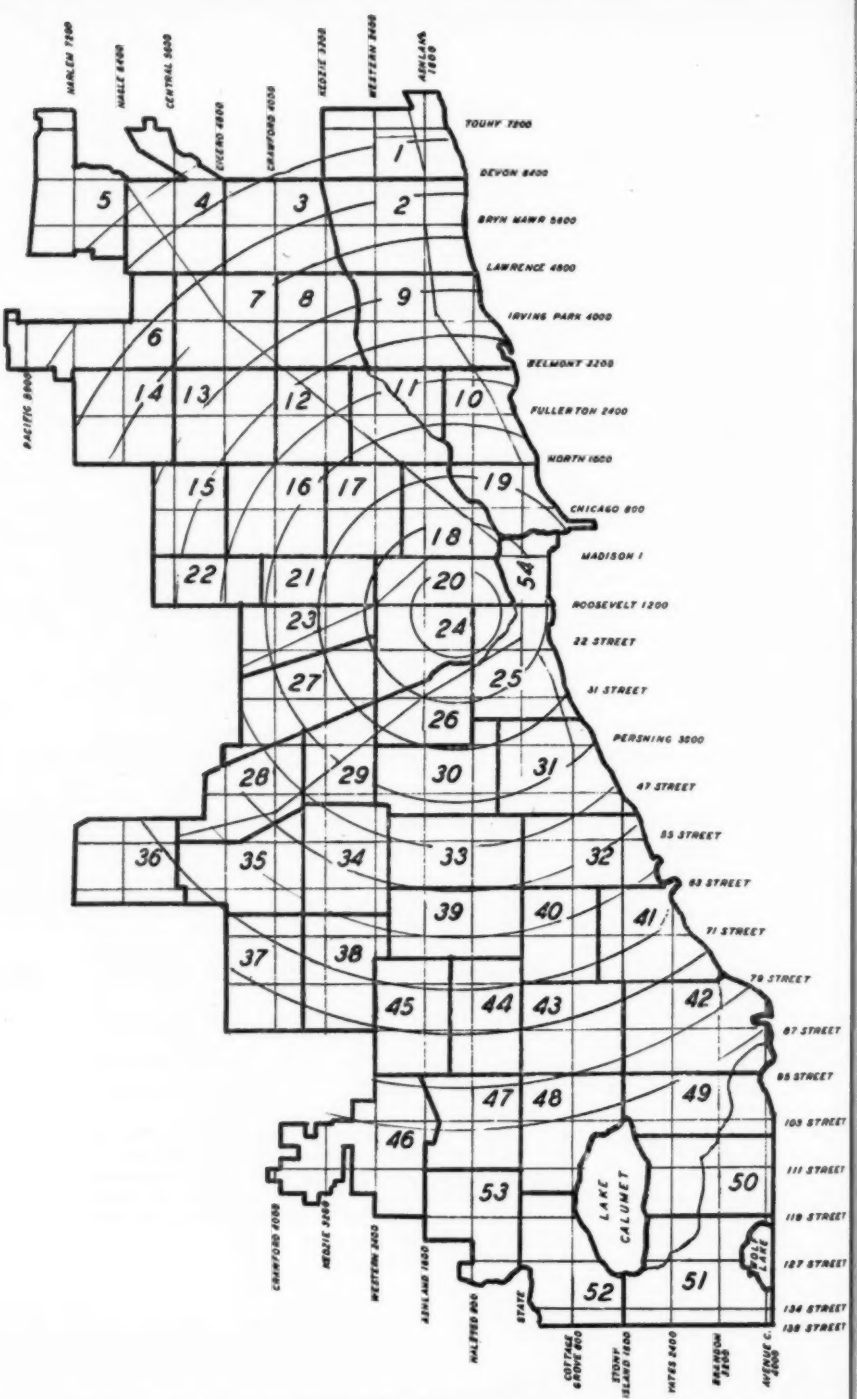

FIG. 6.—Identification map of boundaries of the fifty-four community areas listed in Tables 13 and 14. The concentric circles describe mileage zones about the South Water Market as a center.

results when totaled gave an estimated consumption of fruit and vegetables for the city proper of 1.4 billion pounds (Table 14). The comparison of the percentage of the total consumed in each

TABLE 13*

AVERAGE ANNUAL INCOME PER FAMILY AND PER PERSON, AND AVERAGE NUMBER OF PERSONS PER FAMILY IN FIFTY-FOUR AREAS IN CHICAGO,† 1934

Area No.	Average Family Income	Number of Persons per Family	Average Income per Person	Area No.	Average Family Income	Number of Persons per Family	Average Income per Person
1	$5,495	3.3	$1,665	29	$ 977	4.4	$ 222
2	5,617	3.3	1,702	30	941	4.4	214
3	3,915	4.1	955	31	3,030	4.1	739
4	2,405	4.1	587	32	3,969	3.7	1,073
5	2,421	4.1	590	33	1,633	4.0	408
6	2,051	4.1	500	34	2,680	4.0	670
7	2,620	3.8	689	35	1,225	4.4	278
8	2,867	3.8	754	36	929	4.4	211
9	3,263	3.3	989	37	1,332	4.4	303
10	3,498	3.4	1,029	38	2,634	4.5	585
11	1,632	3.9	418	39	2,453	3.9	629
12	2,214	3.7	598	40	3,434	3.8	904
13	2,262	3.9	580	41	4,963	3.3	1,503
14	2,019	4.2	481	42	2,183	4.4	496
15	3,826	3.6	1,063	43	3,573	3.6	993
16	2,481	3.9	636	44	3,223	3.9	826
17	1,617	4.3	376	45	4,083	3.8	1,074
18	1,073	4.3	250	46	6,115	3.6	1,699
19	6,158	4.4	1,400	47	2,058	4.4	468
20	1,002	5.1	196	48	1,827	3.9	468
21	2,592	4.3	603	49	1,340	4.5	298
22	3,635	3.8	957	50	1,247	4.4	283
23	2,101	4.5	467	51	1,013	4.8	211
24	917	4.2	218	52	1,010	4.6	220
25	1,021	4.5	227	53	1,528	4.3	355
26	923	4.3	215	54	6,006	2.4	2,503
27	1,485	4.2	354				
28	998	4.9	204	Av...	$2,838	3.9	$ 728

* Source: Chicago Evening American, *A Working Manual for Sales Control of the Chicago Market and Tributary Market Areas* (Rev. ed.; Chicago, January, 1937).

† See Fig. 6 for the boundaries of these areas.

area with that area's share of the total population indicates the variations in standards of consumption. If there were no differences between persons in per capita consumption of fruits and vegetables, the proportion of the total consumption in each area

Tables 13
s a center.

would be in the same ratio as the proportion of the total population in that area.

TABLE 14

ESTIMATED TOTAL CONSUMPTION OF FRUITS AND VEGETABLES IN FIFTY-FOUR COMMUNITY AREAS OF CHICAGO GROUPED ACCORDING TO SIZE OF FAMILY INCOME*

Area No.	Total Population	Estimated "Normal" Consumption (Pounds)	Per Cent of City Total
	$1,400 and Over		
1	80,131	53,371,775	3.78
2	125,458	83,505,050	5.92
19	73,462	48,939,950	3.47
41	90,153	60,042,525	4.26
46	20,482	13,639,850	0.97
54	3,530	118,010,050	8.37
Total	393,216	377,569,200	26.77
	$800–$1,100		
3	38,156	19,779,740	1.40
9	178,832	92,710,480	6.57
10	111,907	58,013,855	4.11
15	84,659	43,880,335	3.11
22	37,479	19,427,635	1.38
32	105,708	54,800,220	3.89
40	64,088	33,215,320	2.36
43	45,376	23,524,640	1.67
44	39,714	20,584,010	1.46
45	40,003	20,732,095	1.47
Total	745,922	386,668,330	27.42
	$500–$799		
4	28,387	9,917,060	0.70
5	17,224	6,015,120	0.43
6	43,382	15,155,160	1.07
7	73,200	25,566,000	1.81
8	80,739	28,200,820	2.00
12	101,893	35,589,340	2.52
13	76,969	26,888,220	1.91
16	83,007	28,992,660	2.06
21	86,377	30,173,260	2.14
31	157,822	55,142,360	3.91
34	67,270	23,502,600	1.67
38	11,321	3,951,980	0.28
39	96,349	33,652,620	2.39
Total	923,940	322,747,200	22.89
	$499 or Less		
11	87,616	23,694,720	1.68
14	41,738	11,288,710	0.80
17	90,429	24,452,555	1.73
18	95,911	25,941,745	1.84
20	83,444	22,567,980	1.60
23	89,574	24,224,330	1.72
24	79,904	21,611,680	1.53
25	78,524	21,236,580	1.51
26	45,071	12,191,945	0.86
27	75,830	20,505,850	1.45
28	10,615	2,867,425	0.20
29	46,547	12,587,365	0.89
30	58,817	15,903,015	1.13
33	102,613	27,750,835	1.97
35	13,858	3,744,110	0.27
36	7,143	1,931,185	0.14
37	644	173,980	0.01
42	62,266	16,840,470	1.19
47	32,044	8,668,980	0.62
48	23,716	6,412,220	0.45
49	16,913	4,573,335	0.32
50	6,646	1,800,570	0.13
51	7,052	1,904,340	0.14
52	8,481	2,293,805	0.16
53	30,044	8,126,980	0.58
Total	1,195,440	323,294,800	22.92
Grand total	3,258,518	1,410,279,530	100.00

* Each area's consumption is adjusted for consumption in the Loop district.

In the six community areas having the highest per capita income it is estimated that approximately 12 per cent of the population accounted for nearly 27 per cent of the consumption. The

Loop alone accounted for one-twelfth of the total.[46] With the exception of the Loop and the Near North Side, these districts are in the extreme northeast, southwest, and southeast sections of the city (see Table 14 and Fig. 6). Ten community areas of high-average incomes, and containing 23 per cent of the total population, consumed an estimated 27.4 per cent of the fruits and vegetables. Only four of these areas, however, were located more than five miles from the South Water Market. Approximately 28 per cent of the population distributed among thirteen low-average income areas consumed 22.9 per cent of the total estimated consumption. The remaining twenty-five areas, with 36.7 per cent of the population, consumed a similar proportion. With the exception of the eight districts constituting the Far South Side industrial region, these latter areas were in closest locational adjustment to the South Water Market.

Thus the centrifugal development of the city has placed increasing numbers of persons with the higher incomes and correspondingly larger per capita consumption farthest from the South Water Market. Table 15 compares the percentage distribution of consumption and population on the basis of average distance of the fifty-four community areas from the South Water Market.[47] It will be noticed that outside the mileage zone containing the Loop, only two other zones (8–9.9 and 10–11.9 miles) have consumption levels which exceed the proportion of the population. The influence of industrial regions and the depressed condition of steel workers living on the Far South Side influence the results

[46] Additional evidence of the importance of fruit and vegetable consumption in the Loop is to be found in the number and value of meals (excluding sales of beverages) served by the leading hotels in that area from 1934 to 1936:

Item	1934	1935	1936
No. of covers served.....	8,661,480	7,820,013	7,961,260
Value of foods sales.....	$5,975,951	$6,291,749	$7,275,154

In addition, the convention bureau of the Chicago Association of Commerce estimates the daily number of out-of-town transients in the Loop at from 40,000 to 45,000.

[47] The consumption and population of each district were credited as being as many miles from the South Water Market as their approximate geographical centers.

shown for the 12–13.9-mile zone. This centrifugal development has not stopped at the political limits of the city but is manifesting itself in the movement of population to the suburbs.[48] Many of the suburban dwellers have plots of land on which to raise part of their fruit and vegetable requirements.

Summary.—It has been shown that the South Water Market is poorly located in so far as direct connection with rail team-track

TABLE 15

PERCENTAGE DISTRIBUTION OF POPULATION AND ESTIMATED CONSUMPTION BY MILEAGE ZONE*

Mileage Zone	Consumption	Population
2 miles or less	13.87†	8.91
2– 3.9 miles	17.39	22.35
4– 5.9 miles	23.48	25.76
6– 7.9 miles	22.65	22.32
8– 9.9 miles	15.03	13.21
10–11.9 miles	6.57	2.99
12–13.9 miles	0.87	4.24
14 miles and over	0.14	0.22
Total	100.00	100.00

* Based on average distance of each area from the South Water Market.
† Includes Loop consumption as indicated in Table 14.

facilities is concerned. As compared with the old South Water Market there appears to have been no lessening of the number of such points or of the average length of haul involved. There has been improvement, however, to the extent that the development of the Chicago Produce Terminal and the Wood Street Terminal has tended to concentrate more fruits and vegetables at fewer points and, further, to have provided more adequate facilities for their receipt and track sale. The now universal use

[48] The total carlot unloads of all fruits and vegetables at Chicago during 1937 approximated 2.25 billion pounds. When the estimated consumption of 1.4 billion pounds for the city proper is subtracted from the total unloads, a balance of over 800,000,000 pounds becomes available for suburban and other outside consumption. The South Water Market supplies localities beyond the 40-mile radius of the suburbs with many fruits and vegetables. If it is assumed that the suburbs, with a population of 1,109,858 in 1934, have a somewhat higher per capita income than the city proper, it would appear probable that consumption in this area would approximate about one-half billion pounds.

of the motor truck has reduced the time in transit between points of unload and the market place and between market place and point of use or retail sale. With respect to cold-storage facilities and other wholesale markets, the South Water Market does not appear to have any serious locational problems.

The accessibility of the South Water Market to retail and institutional buyers has been affected by a marked tendency for the population with higher incomes to move toward the periphery of the city and to suburbs. As a result, the persons consuming the largest per capita amounts of fruits and vegetables are generally farthest from the market. Continuation of this tendency may lead to the need for decentralized wholesale marketing facilities. On the other hand, improvements in local transportation and the entrance of some 900,000 persons into the Loop during each twelve-hour weekday period (7:00 A.M.–7:00 P.M.) will continue to act as important forces in keeping the wholesale market at its present location.

The congestion which results from the invasion of large highway trucks—some of them with trailers—into the market place will grow worse as arrivals by truck continue to increase. Ninety-foot driveways between the two banks of stores were thought to be of ample width to permit parking in front of the store to load and unload and still leave room for a double lane of traffic in the center of the drive. Many of the highway trucks are thirty to fifty feet in length; when parked opposite each other and when they are being maneuvered into position for unloading, they are the cause of much confusion and delay.

The possible expansion of highway trucking into the Chicago market is difficult to forecast accurately because the data of truck arrivals now available are probably none too accurate. It is entirely possible that the entire volume of produce received from near-by states from which hauling by truck is now important will be received over the highway. These states are Illinois, Indiana, Michigan, Missouri, Ohio, Tennessee, and Wisconsin. Of the total unloads received from these states in 1933, 44.5 per cent came by truck; this truck movement increased to 70 per cent in 1938. The remaining rail unloads of 5,576 cars are poten-

tial truck tonnage. Meanwhile the truck radius is widening, receipts from Georgia and Florida being not uncommon. Unloads from these more distant states are increasing at a more rapid rate than from the near-by states. The management of the market will have to reckon with an almost certain growth in the trucked-in tonnage.

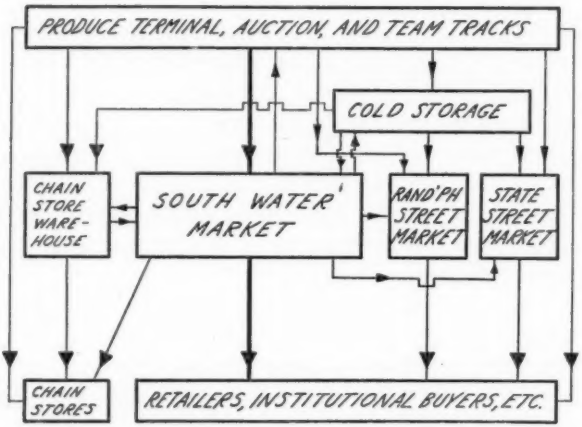

FIG. 7.—Flow of fruits and vegetables from railroad facilities to retail purchasers in Chicago.

MARKET LOCATION AND LOCAL TRUCK TRANSPORTATION

A final measure of the economic location of the South Water Market is the cost of trucking which results from the maladjustment of the market location to points of physical arrival of supplies. The fact that the rail unload points are numerous and widely scattered and that the market has no direct rail connections makes the problem of physical concentration of supplies in the market complicated and expensive. The location of the South Water Market is a determining factor in the routing of fruits and vegetables from the rail unload points to retail stores and other consuming outlets (Fig. 7). These routings in turn decide the nature of the trucking operations to be performed. On the other

hand, any arrangement which operates to facilitate track sales to local merchants results in a lessening of the terminal trucking expense.

There may be said to be three types of trucking concerned with the local transportation of fruits and vegetables from unload point to retail destination: (1) an *initial* haul, from the unload point into the jobbing market; (2) an *intermediate* haul, from one jobbing market to another or between market facilities; and (3) the *final* haul, from the jobbing markets to the retail store or to institutional customers.[49] Initial hauls originate at the Chicago Produce Terminal, the Fruit Auction Sales Company, the Wood Street Terminal, and the team-track facilities of various railroads or the cold-storage warehouses (when the car is unloaded directly into such facilities). Five important groups of destinations are involved: the South Water Market, the Randolph Street Market, the State Street Market, the chain-store warehouses, and the cold-storage warehouses. Some quantities of produce move, in addition, directly from the freight car to retail and institutional buyers and to peddlers.

Intermediate hauls comprehend four types of trucking operation. The first movement involves produce from cold-storage warehouses destined to each of the wholesale markets and to chain-store warehouses. The next movement originates at the South Water Market and terminates at each of the other wholesale markets. A third type of movement involves a back haul from the South Water and Randolph Street markets to chain-store warehouses, the Chicago Produce and Wood Street terminals, and other railroad team tracks for shipment out of the city. Finally, some produce may be moved at times from the chain-store warehouses to the South Water Market.

The final hauls require truck movements from the three wholesale markets to the various types of retail purchasers and from the chain-store warehouses to their unit stores. There is, in addition, a movement through the wholesale truck-jobber to the retailers and through the peddlers to the ultimate consumer di-

[49] Where the inbound movement is based on the motor truck, the initial haul and its expense are eliminated.

rectly. Finally, there is a small movement of produce from chain-store warehouses to independent retail buyers.

Table 16 indicates the average distance fruits and vegetables are hauled for each type of trucking operation, together with the ownership of the trucks used and the persons paying for the trucking services. It appears from this information that the hired truck is used in a minority of cases for each type of haul but is relatively most important for the initial hauls. From an average

TABLE 16*

NATURE OF TERMINAL CARTAGE OF FRUITS AND VEGETABLES AT CHICAGO, 1936

Type of Haul	Percentage of Produce Hauled in:			Average Length of Haul (Miles)	Agency Paying for Hired Truck Charges
	Hired Trucks	Wholesalers' Trucks	Retailers' Trucks		
From railroads to principal wholesale markets	35	65	0	3	Wholesaler or shipper
Between wholesale markets	10	90	0	5	Buyer
From wholesale stores to retail stores	10	5	85	1–10	Retailer

* Source: William C. Crow, *Wholesale Markets for Fruits and Vegetables in 40 Cities* (U.S. Department of Agriculture Circ. 463 [Washington: Government Printing Office, February, 1938]), pp. 130, 132, 134.

of three miles for the initial haul, the length of haul increases to as much as ten miles for the movement to retailers. The cost of the initial haul is borne by the persons owning the goods to be sold; that is, the merchant-middlemen or the shippers. For all other trucking operations the cost is usually assessed against the purchaser.

In order to determine the cost of the initial trucking operation, the 1937 data of unloads of 81,886 carloads of all fruits and vegetables at Chicago were converted, on the basis of their respective weights, into the equivalent of a two-ton load for a motor truck. The total inbound movement thus analyzed amounted to 582,276 truckloads, of which 503,671 arrived by rail and 78,605 by truck.

The bulk of this movement, 446,034 truckloads, consisted of twenty fruits and vegetables.[50]

A second group of seventeen commodities accounted for 89,590 truckloads.[51] The remainder, 30,292 truckloads, was divided among thirty-two fruits and vegetables, including five mixed classifications. Using the published rates applicable to the use of hired trucks, the estimated cost of the initial movement by truck of the volume arriving by rail was $1,915,480 (see Table 17).[52] If the South Water Market had been located with direct access to rail facilities, a large part of this cost would undoubtedly have been saved.

It is possible to compare this trucking cost for the initial haul in 1937 with the cost in 1923. For 1923 it was estimated that 82,446 cars of fruits and vegetables were carried in trucks and wagons on the initial haul. Using the scale of cartage charges in effect at that time, and converting a carload into wagonloads on the basis of 5.9 weighted average wagonloads per car, the total hauling charge amounted to $2,169,384.[53] Evidently some reduction in hauling charges has been effected through a reduction in the scale of cartage charges, through an increase in the proportion of unloads arriving in the city by motor truck,[54] and

[50] Apples, cabbage, cantaloupes and similar type melons, celery, grapefruit, grapes, lemons, lettuce, onions, oranges (including satsumas and tangerines), peaches, pears, plums and fresh prunes, potatoes, strawberries, sweet potatoes, tomatoes, and watermelons.

[51] Asparagus, bananas, beans (green), beets, carrots, cauliflower, corn (green), cucumbers, greens, peas (green), peppers (green), pineapples, radishes, rhubarb, rutabagas and turnips, shallots, and spinach.

[52] The state origins of the various commodities indicated the type of container used for shipment by rail. Conversion figures of the number of such containers per carload were obtained from "Table of Number of Packages per Carload" (U.S. Department of Agriculture, Bureau of Agricultural Economics [Washington, February, 1937] [mimeographed]). Cartage rates were then assessed on the total number of containers or the bulk weight of the car. No costs were assessed against the inbound movement arriving by motor truck. Cartage costs were based on rates published in the *Official Cartage List of the Chicago Commission Team Owners' Association*, effective as of July 1, 1935.

[53] E. A. Duddy, "Report on the Movement of Perishable Produce by Wagon and Truck within the Chicago Metropolitan Area" (unpublished MS).

[54] The 1923 estimate might exceed the 1937 estimate because of the inclusion in that year of the storage movements. These movements were not included for 1937.

through a decrease in reshipments from the city due to an increase in carlot reconsignments.

TABLE 17

RAIL UNLOADS OF ALL FRUITS AND VEGETABLES AT CHICAGO, 1937, IN TERMS OF TWO-TON TRUCKLOADS, WITH CARTAGE COSTS FROM UNLOAD POINT INTO THE SOUTH WATER MARKET

Commodity	Number of Truck-loads	Cartage Costs	Commodity	Number of Truck-loads	Cartage Costs
Apples	26,050	$ 98,704.80	Anise	30	$ 245.76
Cabbage	11,845	46,302.64	Apricots	625	3,000.00
Cantaloupes	10,194	40,774.08	Artichokes	141	635.04
Celery	8,745	34,973.76	Avocados	112	336.00
Grapefruit	17,143	51,678.72	Broccoli	694	4,337.00
Grapes	15,933	70,509.60	Brussels sprouts	304	1,579.50
Lemons	7,597	27,989.64	Celery-cabbage	.....	.....
Lettuce	25,908	110,658.00	Cherries	745	4,967.50
Onions	16,986	57,869.00	Chicory-endive	819	2,345.25
Oranges	48,960	149,830.80	Cranberries	844	4,053.00
Peaches	4,756	19,243.56	Currants	.....	.....
Pears	6,324	24,754.75	Eggplant	59	360.00
Plums and prunes	2,242	13,633.50	Escarole	155	1,116.00
Potatoes	168,507	546,891.70	Figs	5	72.00
Strawberries	2,271	22,863.16	Garlic	471	1,885.00
Sweet potatoes	6,184	22,486.15	Gooseberries	.....	.....
Tomatoes	14,271	67,943.28	Kohlrabi	.....	.....
Watermelons	16,970	75,420.00	Limes	336	4,480.00
			Mixed berries	113	1,000.96
Total	411,336	$1,482,527.14	Mixed fruits and vegetables	560	2,920.40
			Nectarines	210	1,017.24
Asparagus	943	$ 7,071.30	Olives	36	120.00
Bananas	28,245	101,682.00	Parsley	219	1,445.40
Beans (green)	4,108	27,386.25	Parsnips	16	63.00
Beets	366	1,409.00	Persimmons	45	180.00
Carrots	6,942	38,487.00	Pomegranates	95	380.00
Cauliflower	6,711	34,414.50	Quinces	.....	.....
Corn (green)	1,090	4,360.00	Raspberries	79	704.00
Cucumbers	2,880	12,036.95	Squash	750	450.00
Greens	170	975.00			
Mixed citrus fruits	6,604	19,291.56	Total	7,463	$ 37,693.05
Mixed deciduous fruits	1,680	9,408.00			
Mixed vegetables	10,115	48,855.45	Grand total	503,671	$1,915,480.57
Peas (green)	3,149	20,995.15			
Peppers (green)	976	9,074.95			
Pineapples	2,880	11,515.00			
Radishes	910	4,277.40			
Rhubarb	470	2,821.50			
Rutabagas	3,564	11,604.50			
Shallots	590	3,085.67			
Spinach	2,479	26,509.20			
Total	84,872	$ 395,260.38			

Competitive factors affecting the location of the South Water Market.—It has been indicated that the present location of the South Water Market was a compromise between the conflicting interests of the large-scale and small-scale members of the trade. The concentration of unloads at fewer points was likewise a major factor in the relocation plan in the interests of: (*a*) greater economy of operation of the rail facility; (*b*) greater convenience for

brokers and receivers in the inspection and sale of cars and their unloading for local sale; and (*c*) economy in trucking, depending upon the location of the facility. Concentration of unloads of fruits and vegetables was advanced on exactly the same grounds as the need for a Union Stock Yards.

In addition to such reasons, varying degrees of support for the new central market terminal facilities could be expected from the different trunk-line railroads entering and leaving Chicago. If, for example, any single carrier accounted for as much as 15 per cent of the total unloads, that carrier would be less receptive to a plan for pooling business than would a railroad handling only 250 cars per year. Further, a road having an existing large investment in freight yards and team tracks for perishable freight would be less likely to scrap such facilities or divert them to other uses, unless the use of the new terminal facilities would increase the volume of traffic.[55]

It was natural, too, that a road originating large quantities of such traffic would not wish to absorb the switching charges necessary if the cars had to be moved to a central terminal for unloading or reconsignment. This would be particularly true under the pressure of declining business volume. Competition might, however, force a road to patronize any new facilities once they were well developed. One example of shipper preference is to be found in the case of the Wood Street Terminal. At the same time the individual railroads would have to maintain their own team-track facilities in order to offer complete service to those shippers using its lines.[56]

Since 1923, for example, there has been no lessening of the number of team tracks at which fruits and vegetables are unloaded.[57] As noticed in a preceding section, two groups of the

[55] It should be noticed that shippers and receivers demand of the railroads facilities for the spotting of cars; platforms for the inspection, sale, and unloading of cars; wide driveways; rapid reconsignments; information about car locations, time of arrival, etc.

[56] It should be noted that at the time of the building of the Chicago Produce Terminal all railroads were invited by the Santa Fe to participate on an equal basis. The Illinois Central Railroad was the only one to accept the invitation.

[57] An analysis of the capacity of such facilities is reserved for a later section.

more important inbound carriers of these commodities have already invested large sums of money in centralized receiving facilities. Yet in neither case do the parent-roads find it possible to consign all their inbound movement to these facilities. A significant proportion of the Illinois Central's inbound volume is handled not at the Chicago Produce Terminal but at the same South Water team tracks which once served the old market. The continuation of the use of these tracks may be accounted for in part by the existence of special facilities for the handling of bananas and the proximity of the location to the Loop. The Santa Fe Railroad continues to unload fruits and vegetables (principally wine grapes) at its Twenty-first Street team tracks, although the quantities so handled have been declining steadily. The Chicago and Northwestern Railroad, with a heavy investment in the Wood Street Terminal, finds it to its advantage to unload significant quantities of produce other than potatoes at team tracks along Sixteenth Street from Clinton to Morgan streets in close proximity to the South Water Market.

Thus, while the importance of these central terminals has continued to grow since 1925, their combined volume of traffic did not constitute as much as 60 per cent of the total rail unloads at the Chicago market during 1937. The intensity of the competition between railroads for this perishable produce business has prevented any final concentration of the inbound and outbound movements at a central rail facility.

Centralized versus decentralized market locations.—In order to explain the continued existence of the South Water Market in Chicago, it might be well to note the reasons for the lack of decentralized wholesale marketing facilities. When a change in the location of the market was considered, several factors operated against the possibility of developing centralized facilities. From at least one viewpoint such a development is dependent in part upon whether the decentralized local markets could obtain a large enough variety of fruits and vegetables throughout the year to permit economical operation. One important factor operating against this development in Chicago is the differentiation of supplies arriving by each of the important trunk-line railroads.

With twenty-two lines bringing varying quantities of some fruits and vegetables, complicated redistribution and expensive terminal switching and cartage charges would result from any effort to supply district markets with the necessary variety of supplies. The complexity of the Chicago railroad layout would effectively preclude the rapid switching of cars from the inbound railroad to the district market.

Similar difficulties would appear for the inbound truck movements. Instead of supplies concentrating at few markets, the movements would be subdivided into as many streams as there were routes of travel to each district market. Another important limiting factor to any plan for the adoption of decentralized markets would be the availability of locations accessible to important railroads and near streets leading to important arterial highways. The location of the decentralized markets would be subject to many of the factors operating to determine the location of the central wholesale market. In many locations the level of land values would operate to reduce drastically the number of available sites, even though other factors were found to be favorable.

The possibility of establishing a decentralized system in which the South Water Market would serve as the center of a group of decentralized markets should not be overlooked. In addition to stores at the central market, middlemen could operate branch stores at strategic locations. Central receiving facilities would continue to be maintained, but the retailer would be nearer to the source of his supplies. Other advantages would be the complete stocks of produce at the branches, the standardization and simplification of the central market procedures, and a reduction of the congestion factor. Offsetting factors would be: (1) an increase in the total number of hauls, but with possible economies for the retailer and the assumption by the jobber of a larger part of the total delivery cost; (2) the increasing complexity of the problem of inventories and inventory control; (3) a tendency for such cost items as salaries, telephones, and rents to increase; (4) possible duplication of facilities; and (5) increased damage to produce through increased handling and longer time involved in making a sale.

One of the most serious difficulties with any plan for decentralized markets would arise in connection with price-making operations. The concentration of supplies and of buyers and sellers at one market tends to simplify the determination of prices because all conditions which influence the price-making process at that market are immediately at hand. Further, the concentration of supplies better enables prospective purchasers to compare values as between the offerings of competing sellers. Similarly, market news can be more effectively organized at a single central market. In the case of decentralized markets, differences in price would exist between the various markets for the same grades of produce at the same time. If these price differences became wide enough, the entire advantage of decentralization would be lost because buyers would cut across their usual district-market boundaries and patronize the market having favorable price differences.

Another factor influencing the maintenance of the central market is the community of interests between middlemen. The necessity of trading between middlemen and the maintenance of uniform trade standards result from a recognition of this organized interest. But of greatest importance is the fact that an organized group makes possible not only a lower per capita overhead cost burden but also the provision of facilities which would not be possible under individual action. One good example of the result of such co-operative action is the terminal auction. Another good example is that, under the force of this interest, most of the fruit and vegetable middlemen of the old South Water Market relocated as one group to the new market.

The appearance of a new limited-function type of merchant middleman is an additional reason why no development of decentralized markets in Chicago has taken place. This new type is the wagon-jobber who, by operating the equivalent of a branch store or small wholesale market on wheels, has established an effective substitute for either branch stores or district markets. The better-established truck-jobbers carry fairly complete stocks of goods, and, by covering regular routes, they enable their customers to eliminate part or all of their visits to the central market.

These customers are generally those grocers who handle small quantities of fruits and vegetables and who are willing, therefore, to pay the truck-jobber a considerable margin rather than go to the South Water Market.

These jobbers usually purchase goods in but slightly larger units than those sold to the retailer. Their margins, therefore, cover principally their costs of hauling in addition to the cost of buying on the wholesale market. Delivery is included as an essential part of the method of sale. There is no doubt but that the truck-jobber performs a valuable function for those retailers who do not handle large quantities of fruits and vegetables.[58]

The Randolph Street and the State Street markets, already described, represent a phase of decentralization. In the case of the former, decentralization is principally a matter of the commodity handled. Its location does not allow the market effectively to reduce the distance to any important group of purchasers other than those in the Loop. It does furnish an important source of home-grown produce. The South State Street Market, on the other hand, provides fairly complete marketing service for South Side purchasers. It has attracted to itself, for example, a banana dealer who supplies the South Side area with a significant part of its requirements of that fruit.

[*To be concluded*]

[58] See Edwin F. Dummeier, "The Marketing of Pacific Coast Fruits in Chicago" (University of Chicago dissertation [1926]), for a more detailed statement concerning the truck-jobber.

RECENT INNOVATIONS IN RAILROAD FREIGHT AND PASSENGER EQUIPMENT

MERRILL J. ROBERTS[1]

I. INTRODUCTION

PURPOSE OF THE STUDY

WITH one-third of their mileage tied up in the courts and the credit of the balance drastically impaired, the railroads are carrying on at an accelerated pace activities which have as their objective increased revenues and decreased costs. In this connection considerable attention has been given to technological improvement, including the utilization of newer materials, processes, and designs in the construction of freight and passenger rolling stock.

The expense of nonpaying load is such a significant proportion of the total transportation cost that, should the nonrevenue load ratio be made more favorable, it is probable that important improvements could be made in the cost-revenue relationship. On the cost side efforts to render this relationship more favorable have in part assumed the form of attempts to reduce tare weight through the use of lighter-weight equipment, both freight and passenger; on the revenue side, by attempts to stimulate passenger travel with the introduction of high-speed, streamline trains of ultramodern design. Eminently successful results have been attained in numerous cases, but the problem arises as to the extent to which such innovations can economically be carried. In many cases economies are purchased—often dearly—by increased costs in other directions.

It will be the purpose of this study to examine the problems involved and to attempt to determine the degree to which these developments are feasible. This will involve a consideration of the means of weight reduction, the new construction characteristics,

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and an economic appraisal of the matter, with particular reference to effects upon costs and revenue.

IMMEDIATE MOTIVES PROMPTING THE INNOVATIONS

During the past decade there have been three major innovations in rolling-stock construction, namely, new materials, new processes (of welding, primarily), and new design. The principal and immediate motive in each case was a reduction in tare weight which, it was believed, would in and of itself lead to specific advantages, particularly in the form of lower operating costs. In one respect this was associated with the growing use of internal-combustion engines in motive power units. Since an extremely high capital cost is involved in Diesel power, any reduction in the size of the power plant required justifies spending considerably more money on car construction in order to reduce weight.

However, substantial economies were envisioned even with traditional motive power. It was believed that greater operating efficiency would follow from general weight reduction; less motive power would be required for a given amount of pay load, and thus operating costs would be cut by fuel saving. But, it was believed, these economies could be carried further. With less weight per car (either freight or passenger) more cars per train could be carried, thus reducing the number of trains required. Furthermore, for freight traffic, there would be an increase in the amount of available capacity per car; hence fewer cars would be required to handle a given amount of traffic, and further reductions in train operating costs would be effected. In addition, yard costs would decline because of the smaller number of cars to be handled.[2] Owing to the desirable physical characteristics of the new materials, coupled with the advantages to be derived from the use of improved welding processes, reduction in car maintenance and repair costs were also anticipated.

Weight-reduction plans, however, considered more than the cost angle. It was recognized that this is an age of speed and that airplane service was encroaching upon passenger traffic just as in

[2] These arguments will be dealt with in detail in Secs. IV and V, at which time their overoptimistic nature will be indicated.

the 1920's the highway carriers had successfully invaded the railroad freight domain. Railroad management realized that it is easier to retain than regain such traffic and that steps had to be taken to curb this trend. Their answer was substantially increased speed, a development which was facilitated by weight reduction and the adoption of the new designs. The major features of the new design were streamlining and articulation, adopted as methods of reducing air resistance and thus facilitating high-speed operation at lower costs. In addition, it was expected that articulation would contribute somewhat to weight reduction. The new elements of design were also intended to attract passengers to the road, as a sort of advertising medium.

In many instances some of these expectations have doubtless been realized. In other cases the judgment behind the changes has not been so clearly vindicated, possibly due to a lack of sufficient time to permit the final answer to evolve. Owing to this factor, generalization is difficult; but an examination of the innovations attempted and their indicated results to date may serve to elicit provisional conclusions regarding the relationship between the light-weighting of carrying equipment and the efficiency and economy of railway operation.

II. NEW MATERIALS OF CONSTRUCTION

The reduction of dead weight is the basic idea in the modernization of railway carrying equipment. This objective is being sought through the three mediums of improved materials, processes, and design. Doubtless the first of these has received the greatest emphasis. In this respect the key to the economies sought is found in new materials of superior quality, having (1) sufficient strength to make possible the construction of lighter equipment without sacrifice of strength or safety, (2) increased corrosion resistance to insure an equal or longer period of service in spite of thinner sections, and (3) ductility and other physical properties to make possible the utilization of normal fabricating methods. Implicit in these specifications is the basic requirement that the cost of the materials should be sufficiently low to enable the railroads to utilize them in their equipment on a self-liquidating basis.

There are three products which have been most widely used in the quest for the satisfaction of these requirements: low-alloy high-tensile steels, aluminum and its alloys, and stainless steel. The evaluation of weight-reduction possibilities requires a somewhat detailed examination of the characteristics and costs of these materials.

LOW-ALLOY HIGH-TENSILE STEELS

The low-alloy high-tensile steels are supplied by several companies but have physical and chemical properties that vary within fairly narrow limits. In the description that follows the United

TABLE 1

PHYSICAL PROPERTIES OF COR-TEN AND CONVENTIONAL STEEL*

Property	Open-Hearth	Cor-Ten
Yield point (lb. per sq. in.)	25,000–35,000 min.	50,000–60,000 min.
Tensile strength (lb. per sq. in.)	35,000–50,000 min.	65,000–75,000 min.
Endurance limit (lb. per sq. in.)	25,000	45,000
Modulus of elasticity (lb. per sq. in.)	28,000,000–30,000,000	28,000,000–30,000,000
Elongation (percentage in 2 in.)	34–25	27–22

* This and a great deal of other information regarding Cor-Ten was drawn from a booklet issued by the United States Steel Corporation, entitled *Cor-Ten*.

States Steel Company's product "Cor-Ten" is treated as representative of this generic class. This procedure is justified in view of the widespread use of this product in structures made of this type of material. Cor-Ten is an open-hearth chromium-copper-silicon-phosphorus steel, combining the alloying elements used in relatively low percentages. Table 1 indicates in summary form the more important physical properties of this product, offering, in addition, a comparison with low-carbon open-hearth steel.

This table indicates marked superiority for Cor-Ten. It possesses a higher yield point—approximately twice that of mild steel—indicating greater impact strength, or greater resistance to sudden blows, an important consideration when dealing with such structures as rolling stock. Cor-Ten is substantially tougher and stronger per unit, as indicated by its decidedly higher measure of tensile strength, this being about one and one-half times that of

mild steel. Percentage of elongation is the measure of the degree of ductility. This determines the extent to which the steel may be deformed without breaking and is important in indicating the workability of the metal in the shop without increase in shop costs necessitated by retooling the shops. In this matter the regular open-hearth steel shows a slight superiority, but the difference is not sufficient to make necessary alterations in methods of fabrication. Modulus of elasticity is a measure of stiffness, or of the extent to which a member will deflect under a given load, and is approximately the same for all steels. Finally, the low-alloy steel has 80 per cent greater fatigue strength, or resistance to vibration, as measured by the relative endurance limits. This indicates substantially greater ability to withstand stresses caused by repeated loading and reversal of stress.[3]

For light-weight construction, involving as it does the use of thinner sections in the interest of reduced tare weights, corrosion-resistance properties are extremely important.[4] There has not yet been time to determine the corrosion-resisting properties of the new materials by active life in service, but a number of tests have been conducted during recent years which substantiate the claims of the manufacturers with respect to this very important quality.

One such test was conducted in 1934 to show the increased life of cars resulting from the use of high-tensile steels under severe service conditions. The Carnegie-Illinois Steel Company repaired fifty hopper cars utilized intensively in coal and coke carrying, using Cor-Ten on one half of each car and copper steel, a product superior to ordinary low-carbon steel, on the other. The copper steel used was of normal thickness—3/16″ plates on the sides and ends, and 1/4″ plates on the floors and longitudinal hoods. The Cor-Ten plates in one half the cars were of this same thickness; in the balance the sides and ends were of 1/8″ thickness and the floors 3/16″. After a thirty-month test period the first holes were

[3] United States Steel Corporation, *Cor-Ten*, pp. 32 and 33.

[4] Corrosion is of two types: (1) atmospheric and (2) accelerated, which is due to workings of the sheets, localization of stresses, etc. It is the latter which presents the real problem (*Railway Age*, CIII [1938], 729).

discovered in the copper-steel plates, located in the 1/4″ longitudinal hoods at the slope sheet of three of the cars in coke service; after forty-two months similar holes had been discovered in a total of five of the cars. By contrast, only one of the Cor-Ten sections showed any defects despite substantially reduced thickness—a small hole in the end of the longitudinal hood at one slope sheet, and another in the left hopper chute near the lower edge of the same car.

This test indicates that service life before holes developed was approximately 85 per cent longer for Cor-Ten per unit of thickness, a superiority attributable to higher corrosion resistance in handling materials of a highly abrasive nature, represented here by coke.[5] As a further indication, representative samples of Cor-Ten and of copper steels were exposed to industrial atmosphere for two years, and it was quite clearly established that the resistance to atmospheric corrosion of Cor-Ten was four to six times that of plain steels. Similar tests have indicated also that corrosion in Cor-Ten progresses at a decelerating rate, providing a uniform corrosion with consequent absence of deep pits and holes. This is explained by the fact that the resulting surface is evenly corroded, being coated with a film of rust that is denser, harder, and more protective than that which forms on ordinary steels.[6]

ALUMINUM ALLOYS

The second material which has received considerable attention in the development of light-weight equipment is aluminum and its alloys, the most common alloying elements being copper, silicon, magnesium, and iron.[7] Specifications shown in Table 2 indicate an inferiority in many physical characteristics relative to the high-tensile steels and a corresponding superiority to open-hearth steel in all properties except elongation and modulus of elasticity.

[5] H. F. Stuebing, "High Tensile Steels Demonstrate Durability as Car Material," *Railway Age*, CIV (1938), 1053.

[6] United States Steel Corporation, *op. cit.*, p. 26.

[7] Aluminum Company of America, *Alcoa Aluminum and Its Alloys*, pp. 71 and 72.

According to these specifications aluminum, with its yield point of 35,000 lb. per square inch, possesses slightly greater impact strength than does plain steel, but substantially less than that of high-tensile steel. Its measure of tensile strength, 58,000 lb. per

TABLE 2*

PHYSICAL CHARACTERISTICS OF HIGH-TENSILE HEAT-TREATED ALUMINUM

Characteristics	Measurement
Modulus of elasticity (lb. per sq. in.)	10,300,000
Yield point (min.) (lb. per sq. in.)	35,000
Tensile strength (lb. per sq. in.)	58,000
Elongation (percentage in 2 in.)	26

* Source: W. H. Mussey, "Car Design and Construction," *Railway Age*, CIII (1938), 729.

square inch, shows it to lie about halfway between the other two materials. In ductility, as measured by percentage of elongation, it is approximately equivalent to the high-tensile steels. The modulus of elasticity for aluminum, measuring the degree of deflection under any given load, is extremely low.

STAINLESS STEEL

The third important material considered for light-weight car construction is stainless steel, containing 18 per cent chromium and 8 per cent nickel. The Zephyrs offer what is probably the outstanding example of its use in the new units. This material is

TABLE 3*

PHYSICAL CHARACTERISTICS OF STAINLESS STEEL

Characteristics	Measurement
Modulas of elasticity (lb. per sq. in.)	28,000,000
Yield point (min.) (lb. per sq. in.)	60,000–125,000
Tensile strength (lb. per sq. in.)	110,000–175,000
Elongation (percentage in 2 in.)	10–45

* Source: Mussey, *op. cit.*, p. 729.

noncorrosive and, owing to the physical characteristics outlined in Table 3, presents excellent weight-saving possibilities.

The summary shows this material to be somewhat superior to both aluminum and the high-tensile steels. It is superior to aluminum in modulus of elasticity, a quality which is approximately

the same for all steels. Its impact strength, as measured by yield point, is from one and a half to three times that of aluminum, nearly twice that of low-alloy steel, and from two to four times that of regular open-hearth steel. A similar advantage is seen for this material in the case of tensile strength, being about twice that of the high-tensile steels, from two to three times that of aluminum, and from two to four times that of low-carbon open-hearth steel. As a measure of the degree to which the material may be deformed without breaking, stainless steel, with elongation specification of 10–45 per cent is, in its more desirable forms, superior to either of the other materials. Thus it can be seen that it is possible to build stainless steel structures of thinner sections than could be done with the other materials.

EVALUATION OF THE ALTERNATIVES

Costs.—With reference to prices, aluminum is the most expensive, followed by stainless steel, with the high-tensile low-alloy steels being substantially the cheapest. The base price for stainless-steel sheets, such as would be used for the siding of a car, is 34 cents per pound plus "extras" of 5–20 cents per pound.[8] The price for shapes is somewhat lower, being quoted currently at 24 cents, again plus "extras." Aluminum sheets vary in price from 30.5 to 63 cents, depending upon gauge and width. In this case, also, there are extra charges above the base price. Cor-Ten is quoted at 3.53 cents per pound plus "extras." Considering a per pound cost of 3 cents or less for conventional steel, it is apparent that the last named is the only material which even remotely lies within the range of mild steel. This price difference is partially offset by the higher yield point of the high-tensile steel which makes possible a considerable reduction in the weight of the material required.

Physical and structural desirability.—These materials are the ones which have received serious consideration with respect to

[8] Typical "extras" are those for shearing, large quantities, and special finishing. As indicated by one prominent supplier, the cost of extras with Cor-Ten are considerably less than with the other materials, while those for stainless steel are of considerable importance. The presence of the extras makes an exact, realistic price comparison difficult without particular specifications.

weight-reduction possibilities. On the basis of the requirements of strength, corrosion resistance, ductility, and cost, which of the three seems to present the best opportunities for economical utilization? It is evident that both aluminum and stainless steel offer weight-reducing possibilities which the intermediate steels cannot match. The latter must be regarded as a compromise medium, and the problem becomes that of determining the wisdom of the compromise.

In the past stainless steel has not been widely used in the essential superstructure despite its superior physical characteristics. The engineer, when working with stainless steel, cannot design cars based on stress calculations of the ordinary open-hearth steel because the car, when subjected to buffing stresses, would have too much flexibility due to the resiliency of the material. Thus, to provide for proper strength and rigidity, it is necessary to increase the cross-sections of load-carrying members made of stainless steel, when subject to compression stresses, sufficiently to keep the amount of deflection within the required limits.[9] In order to accomplish this very essential result, it is necessary thus to eliminate a noticeable portion of the weight-saving possibility, at the same time making the resulting structure correspondingly more expensive. But, even considering the lighter sections required, the use of this material adds a sufficient amount to the cost of the car to make doubtful its expediency.

As a further deterrent to its use, improper welding results in chromium carbide precipitation and consequent impairment of corrosion resistance. There is a welding process which has been developed which will insure safety from this defect, but it is the exclusive possession of the Budd Company. Construction methods are thus monopolized, eliminating the possibility of the purchase of this type of equipment on a competitive basis.

Similar difficulties appear in connection with aluminum. It is considerably more costly than either conventional steel or the low-alloy high-tensile steels. Although lighter sections can be safely utilized than is true with low-carbon steel, the initial cost of a car constructed of this material is still substantially above

[9] W. H. Mussey, "Car Design and Construction," *Railway Age*, CIII (1938), 729.

that of a conventional car. Its weight-reduction possibilities are extremely promising, but in the opinion of many engineers it is doubtful whether, over a long period of time, aluminum alloy structures can withstand the operating strains to which they would be subjected. In addition, the question of the ability of this material to resist corrosion is an open one which can be answered only by the results of actual service.

The final alternative is the intermediate high-tensile low-alloy steel. Of the three named, this material has been, and doubtless will be, most widely used.[10] Selling for only about a cent per pound more than regular open-hearth steel, it is not prohibitive in price, while its superiority to conventional steel in every respect important for car construction was indicated previously. Its unit weight is greater than that of either of the other two materials, but this disadvantage is largely overcome by the fact that less reinforcement is required to keep certain of the sections within safe deflection limits. Cars of these intermediate steels will run about 8 or 9 per cent heavier than those of either aluminum alloy or stainless steel, but they are also substantially cheaper. The corrosion resistance of the low-alloy steels, as estimated from laboratory tests, seems to surpass that of stainless steel and certainly is higher than that of aluminum. Another important feature of this material is that its alloy content is sufficiently low to facilitate welding, due to the flowing properties and controllability of the weld puddle.[11]

Conclusion.—From every consideration of cost and weight it may be said, tentatively at least, that the low-alloy high-tensile steels seem to offer the greatest possibilities in the way of economical weight reduction, a conclusion which is borne out by the report of the Mechanical Advisory Committee to the Federal Coordinator of Transportation (1935). This material satisfies the requirements which the new mediums should meet, namely: (1) sufficient strength, (2) superior corrosion resistance, and (3) ample

[10] This generalization is true only with respect to individual cars; it does not extend to full trains.

[11] "Progress in Freight Car Construction," *Railway Mechanical Engineer*, CXII (1938), 275.

ductility. It is yet to be demonstrated whether or not the equipment utilizing these intermediate alloy steels can be used on a self-liquidating basis, but they certainly more closely approach this goal than do either stainless steel or aluminum alloy.

III. NEW PROCESSES AND DESIGNS

WELDING

Largely independent of the introduction of new materials in equipment construction, yet possessing important tare-reducing possibilities, is the substitution of welding for riveting made possible by the recent development and improvement of welding processes, particularly the electrical resistance techniques.[12]

The processes.—The principle involved in these techniques is that the electric current passing through the high-resistance materials at the point of contact creates there sufficient heat so that the two constituents can be forced together under pressure. Spot welding is a variation of this process and is used primarily for joining two thin plates. Coincident with the application of high pressure by two copper electrodes an electric current is passed between the electrodes and through the plates to be joined. The high temperature caused by the resistance at the point of contact welds them together at a small spot.[13]

A further variation of this electrical resistance process which has a special application in the construction of light-weight passenger cars built of thin sheets of stainless steel is termed "shot welding," rights to which are the exclusive property of the Budd Company. In this process the pressure, intensity, and duration of the current are automatically controlled; consequently, the heat penetration beyond the weld is very slight and the physical properties of the steel, particularly its corrosion resistance, are not impaired.[14] This process is particularly valuable in the fabrication of stainless steel.

[12] These new processes represent advances over the electrical method discovered as early as 1877. Welding, however, was extremely rare in any railroad equipment before 1927.

[13] Mechanical Advisory Committee (L. K. Sillcox, chairman), *Report of the Mechanical Advisory Committee to the Federal Coordinator of Transportation* (1935), p. 174 (hereafter this publication will be referred to as the *Sillcox Report*).

[14] *Ibid.*

The third important type of welding in use in car construction is arc welding. The parts to be welded are placed close together and heated to welding temperature by an electric arc which passes across the space between the parts and the electrode, which is either a metallic rod or a carbon rod. In the latter case any additional metal necessary to complete the weld must be supplied by a filler rod which is also melted by the arc. In the other process the filler is supplied by the melting of the rod which forms the electrode.[15]

The welds possess strength which is substantially equal to that of the component material, at the same time maintaining ample ductility and showing no evidence of accelerated corrosion at the joint. Tests conducted with 3/8″ Cor-Ten plates welded with regular carbon steel welding rods (by arc welding) showed an ultimate tensile strength of 70,700 pounds per square inch for the plates before welding, and 71,700 pounds per square inch after welding.[16] On the other hand, welding is somewhat costly relative to riveting as the equipment required in the new processes is very elaborate and expensive. But against this factor are the advantages accruing from the utilization of welding in the car structure.

Advantages of welding.—The advantages of welding have been demonstrated empirically and may be summarized as follows: (1) Welding is an important factor in weight reduction due to the elimination of flanges, rivet heads, and the overlapping of plates.[17] Further, it facilitates the utilization of the thinner sections of low-alloy high-tensile steels, since there is a tendency toward pulling-out around the rivet heads when the older method of fabrication is used with thin members. (2) It offers a smoother body surface. (3) Stresses are not concentrated, as is true with riveting, but are distributed uniformly along continuous welds. (4) Welding provides absolute sealing against water seepage, consequently curtailing corrosion and making possible lower main-

[15] *Ibid.*, p. 175.

[16] The substantial weight reduction (30 per cent) effected by the Milwaukee Road in their original Hiawathas, constructed entirely of conventional material, was accomplished by the substitution of welding for riveting.

[17] *Sillcox Report*, p. 166.

tenance costs due to the resulting high standard of reliability. (5) It increases the strength of the unit because the joints are stronger than riveted joints. There are no rivet holes in the material, which tend to reduce the area of effective stress resistance, thus necessitating the use of heavier sections to prevent a weakening of the adjacent area. The joint is actually stronger than the parent-plate. (6) It permits the effective joining of any thicknesses and is adaptable to any design.[18] (7) A more rigid structure is obtained, as rivets tend to wear and become deformed, the ultimate result being a tendency of the joint to come loose.[19]

The question of the feasibility of welding as against riveting is dependent upon an analysis of the circumstances prevailing in each individual situation. Account must be taken of such factors as the amount and localization of stresses; the importance of weight reduction in a given unit—whether it is worth more to secure a structure of reduced weight, and, if so, how much; the need for special strength at particular points; and, finally, the thickness of the materials. These and similar questions must be asked; in the light of the answers it is possible to determine if a given structure should, in the interests of economy, be welded or riveted. It should be recognized here that there are not two rigid categories—all-welded and all-riveted cars. Rather, it is possible to apply the above analysis to each option and determine for each joint the feasibility of welding or riveting. As a fairly applicable generalization it may be stated that riveting is, in the main, satisfactory for conventional steel members, as they are thick enough to withstand the stresses applied, with the final decision hinging on the results of the analysis indicated herein. However, with light-weight members and the concomitant danger of pulling-out around the rivets, welding is probably more desirable. In any case welding offers definite advantages which must be considered before an enlightened decision can be reached relative to economical car construction.

[18] "General American Light Weight All-Welded Box Car," *Railway Age*, CV (1938), 843.

[19] *Sillcox Report*, p. 176.

STREAMLINING

The major alterations of design consist primarily of the introduction of streamlining, articulation, and the four-wheel truck.[20] The first has received the most popular attention and seeks a reduction in resistance to train movement. Among the factors which make up train resistance and determine the amount of work which the power plant must do are air resistance and weight. The purpose of streamlining is to reduce the former, with resulting reduction in power costs and facilitation of high-speed operation. Air resistance is negligible with slowly moving trains but engenders more serious consequences at high speed.[21]

The shape of the front end of the train has little direct effect on air resistance; but it should be so formed as to reduce the turbulence generated in the air, thus reducing the skin-friction effect of such turbulence on the following areas. The rear end should be designed to reduce the drag due to the vacuum formed, a goal which can only be approximated in passenger cars due to the impracticability of securing sufficiently long and easy curves. It seems pretty well established that streamlining effects a substantial reduction in resistance at velocities of fifty miles per hour and upward, the reduction increasing with the speed and being greater for shorter than for longer trains because of less skin friction. Thus the effectiveness of streamlining will depend ultimately on the profile of the road, the proportion of the total run over which it is possible to operate at high speed, and the length of the train.[22] The decision must be made in individual cases in the light of specific operating conditions. In any case, it must be kept in mind that air resistance accounts for but a small part of the total resistance to train movement.

The only important saving offered by streamlining as such is in fuel consumption, and this, as indicated above, is insignificant so long as trains have a high ratio of length to cross-section, i.e.,

[20] These features of design, particularly streamlining and articulation, have been applied only to passenger equipment construction.

[21] H. S. Haines, *Efficient Railway Operation* (New York: Macmillan Co., 1919), p. 362.

[22] *Sillcox Report*, p. 599.

for the longer trains. Furthermore, it is doubtful if any reduction in fuel costs which could be effected would be of controlling importance. For July, 1939, fuel consumption by Class I roads amounted to $19,388,677.[23] During this same month total operating expenses were $241,962,091.[24] Thus, for this month, fuel costs are only about 8 per cent of the total operating expenditures. Probably of more significance would be right-of-way and equipment maintenance expenses which are adversely affected by high speed.

This is an age of speed, and the railroads must have full regard for the insistent demand of the traveling public for high-speed movement. It is just as essential, however, that they not overlook the fact that this improvement in the quality of their product can only be secured, as may be expected, at some increase in the cost of producing it. Considerable increases in speed can still be attained. But operation at maximum speeds increases operating costs, hence efforts to attain a minimum time for any given run might well take the form of increased efficiency of organization and operation, resulting in less avoidable delay on the road, as against running at maximum speed which acts to increase costs. The railroads are wise in speeding up their service, but due consideration must be given to other factors involved. High-speed operation tends to increase risks to persons and property. A judicious balance must be struck between service (here represented by speed), cost, and safety. In any case, it is important to recognize that ultimately traffic desiring extreme speed will go to the airways anyway. Any determination of the feasibility of streamlining, however, must take account of the psychological appeal of streamlining and its stimulating effect on passenger revenues.

ARTICULATION

Articulation[25] is a feature of design in which all the cars of a train consist are structurally joined, each being mounted on a

[23] Interstate Commerce Commission, *Fuel and Power for Locomotives and Rail Motor Cars, July, 1939.*

[24] Interstate Commerce Commission, *Operating Revenues and Operating Expenses of Class I Steam Railways in the United States, July, 1939.*

[25] A technical term referring to the makeup of the train.

common truck along with the adjacent car. The entire train becomes a single unit. It is designed primarily to save weight and incidentally to secure better riding. In this connection the greatest opportunity for weight reduction arises from the ability to use one common truck for each pair of car ends. This elimination of trucks is very effective in the elimination of dead weight. But, however much weight reduction can be secured through articulation, it is not capable of general application in that it results in a detrimental loss of interchangeability. It is impossible to utilize any but the one set of units in any one train. This is particularly undesirable in view of the prevailing seasonal variations in passenger traffic. Articulation, generally employed, assumes a method of leveling-out over the year the demand for passenger service.

Articulation originally had as its major objective improvement in riding quality. But with the advent of tight-lock couplers and improvements in draft gears and trucks it is now possible to secure the same results without resort to the extremes involved in articulation. Moreover, it is not certain that the beneficial results of articulation with respect to riding quality exceed the detrimental. The Mechanical Advisory Committee in its report to the Federal Coordinator of Transportation indicated its belief that the advantages of this innovation were outweighed by the disadvantages.

> Articulated construction embodies some inherent disadvantages aside from limited interchangeability. With double truck cars, any disturbance imparted to the rear truck of a leading car is opposed by the front truck of the following car, and each car exerts a steadying influence on the other through the friction of the buffers. With articulated construction we have two free ends mounted on a common truck so that the restraining influence of one car upon another is lost, and the inertia effects of the two free ends may result in some disturbance of car body of greater amplitude for a given disturbance of truck than will occur with double truck cars.[26]

Thus, with the adoption of articulated consists it is dangerously possible that the final result may be not improved riding comfort but a decrease in this important quality.

Finally, articulation is a frequent component of a plan for

[26] *Sillcox Report*, p. 599.

streamlining. Its usefulness here is limited by the expediency of streamlining itself, which, as was pointed out, is subject to rigid practical limitations. Viewed practically, the case seems to lie against the general adoption of articulation. This generalization is subject to modification in particular circumstances, for example, in cases where the demand for the facilities offered by a particular train is relatively constant. But the applicability of the generalization is largely borne out by the limited extent to which articulation as an innovation of design has been accepted.

THE FOUR-WHEEL TRUCK

The final change in design which will be considered is the introduction of the four-wheel truck, also in the interests of weight reduction, and made possible by significant diminutions in the weight of the superstructure. The conventional six-wheel trucks (5″ × 9″ journals) weigh approximately 50,000 pounds per pair, which is little less than one-third the total weight of a conventional coach. Four-wheel trucks of conventional material weigh about 35,000 pounds, representing approximately a 10 per cent reduction in the weight of a 150,000-pound car. By using specially cast steel-alloy materials it is possible to reduce the weight of a pair of trucks to about 30,000 pounds.[27]

The limitation of riding comfort for passengers is imposed here, however, as the six-wheel truck, having a longer wheel base and thus providing more perfect equalization, rides better than the four-wheel truck. In addition, the six-wheel truck is advantageous in that it effects a greater distribution of weight. Rather than attempt to save weight by use of four-wheel trucks, it may be preferable to consider a light-weight six-wheel truck, providing better riding and braking and lower wheel and rail pressure—all especially important considerations for high-speed trains.[28] For the same center plate load steel-alloy six-wheel trucks weigh only about 8,000 pounds more per car than do alloy four-wheel trucks.

However, the four-wheel truck is coming into increasing use,

[27] *Ibid.*, pp. 620–24.

[28] William H. Sheehan, "Steel Castings and the Railroad," *Railway Age*, CIV (1938), 271.

and the deficiency in riding quality, often in the form of excessive vertical action, can be noticeably remedied by special applications in the interest of equalization. On the new Reading Crusaders each truck is fitted with four hydraulic shock absorbers to dampen the lateral swing action.[29] The triple bolster four-wheel trucks used on the Union Pacific and Southern Pacific streamline trains secure diagonal equalization by providing coil springs at the four points of application of the center plate load to the truck frame.[30] These features largely compensate for the inherent superior riding quality of the six-wheel truck, but it must not be overlooked that such applications necessarily involve extra initial outlays, a factor which must be carefully considered in deciding upon the efficacy of four-wheel trucks in any given structure.

RECAPITULATION

This review was designed to summarize descriptively and somewhat critically the new processes and designs which are finding acceptance in the field of railway equipment construction, including brief surveys of welding, streamlining, articulation, and the four-wheel truck. In recapitulating, it may be said that fabrication by welding in lieu of riveting offers many advantages in the way of reducing tare weight and also providing a stronger, more reliable structure. Streamlining provides certain operational advantages within a fairly narrow range of particular conditions which are not met sufficiently often to warrant a great deal of hope for increased economies in this direction. Such as do arise are likely to be offset by increased costs in other directions. Articulation is of doubtful expediency, largely because of the rigidity in train makeup which it imposes. It is possible also that it exerts a detrimental effect on riding quality. The four-wheel truck, on the other hand, does present wide possibility of weight reduction, but it, too, is likely to affect riding quality adversely.

[*To be concluded*]

[29] "Reading Installs a Light Streamline Train," *Railway Mechanical Engineer*, CXII (1938), 1.

[30] Sheehan, *op. cit.*, p. 270.

A NOTE ON FEDERAL TAXATION OF CHAIN STORES

GEORGE H. BROWN[1]

THE growing number of state tax laws directed at chain stores and their general success in the courts[2] has introduced another factor that must be taken into consideration by chain-store executives when long-run plans are being made. Doubtless, the continued interest in superstores by large chains is in part due to the emphasis in tax laws on number of stores rather than on volume of business as the basis for calculating the amount of tax to be placed on an individual chain unit.

In addition to the existing and future state legislation, far-sighted chain-store managements must anticipate possible federal chain-store taxation in their plans for the future, even though no such tax is now on the books. It is common knowledge that Representative Patman has twice introduced a bill providing for the federal taxation of chain stores which not only increases the tax per store as the number of stores in the chain increases but provides for the multiplication of such taxes by the number of states in which a given chain transacts business.[3] Although Mr. Patman's bills have never had a hearing, the possibility of federal legislation definitely exists, and it must be evaluated.

The purpose of this paper is to examine the possibility of a federal chain-store tax, not on the basis of the political strength of the proponents or opponents of such a law, but on the legal limits to the taxing power of the federal government as laid down in the Constitution. This necessitates the forecast of Supreme Court decisions and, consequently, the conclusions reached must be tentative in nature and must be expressed as probabilities rather than as certainties. It is hoped, however, that this paper may help to

[1] Mr. Brown is instructor in marketing at the University of Chicago.

[2] Cf. M. W. Lee, "Anti-Chain-Store Tax Legislation," *Journal of Business of the University of Chicago*, Vol. XII, No. 3, Part 2 (July, 1939).

[3] See appendix of this article.

clarify the immediate problem taken for study and also illustrate a method of attacking similar problems.

All executives recognize that federal laws must conform to the federal Constitution and that consequently all laws are subject to review by the Supreme Court. But how many know the general framework of the Constitution as it affects tax laws or even recognize that federal power in this respect is quite different from state powers, since the former is a delegated power? An indication of the general attitude toward federal taxing power can be obtained from the following statements by Representative Patman:

QUESTION: Why propose a tax for the purpose of curbing interstate chains? Why not offer a bill to prohibit their expansion in more than one state?

ANSWER: Such a proposal was considered. Some of the best lawyers in this country said it would not be constitutional if enacted. Therefore, a bill to tax was agreed upon for the purpose of reaching the same objective. No one can doubt the constitutionality of a law thus using the taxing power of the Government.

QUESTION: Is this an abuse of the taxing power of Congress?

ANSWER: No. The Republicans as well as the Democrats have in the past used the taxing power as a vehicle to reach a worthy objective.[4]

The object of H. R. 1 is to restrict interstate chain stores to the boundaries of one State, or to a smaller area than some of them now cover.

The question is asked: "If that is the object, why not leave out the tax provision and offer a bill that says an interstate chain cannot operate in more than one State?"

My answer is that such a proposal, if enacted, would probably be held unconstitutional. Whereas, if we use the taxing power of Congress to reach the same objective, there will be no doubt of the constitutionality of the law, when enacted.

Why did Congress place a 10 per cent tax on State bank currency after the War between the States? Was it for the purpose of raising revenue? No. It was to save our currency system, although many state banks suffered from it.

Why did Congress place a tax on the ownership and transfer of machine guns? Was it in order to raise revenue? Not at all. It was for a better law enforcement against criminals. Congress did not have the power to require registration of such guns or their transfer, but it did have the power to place a tax on such ownership or transfer, and if the tax is not paid, a criminal law is automatically violated.

[4] *Congressional Record* (76th Cong., 1st sess.), February 27, 1939.

> Thus it is not at all unusual for Congress to use its taxing power in passing a constitutional law to carry out a worthy objective.[5]

Mr. Patman's assurance that a tax law has greater possibility of being considered constitutional than other types of law is, of course, well founded. The broad taxing power of the federal government has long been recognized by the Supreme Court, as is indicated in the following statement from the *License Tax Case*, 5 Wall. 462:

> . . . . The power of Congress to tax is a very extensive power. It is given in the Constitution, with only one exception and only two qualifications. Congress cannot tax exports, and it must impose direct taxes by the rule of apportionment, and indirect taxes by the rule of uniformity. Thus limited, and thus only, it reaches every subject, and may be exercised at discretion.

Furthermore, a fundamental philosophy of the Court has been that the power to tax is an essential element in maintaining a sovereign government,[6] and consequently every possible effort should be made to uphold any tax law that has been enacted. This explains to a large degree the extent to which the Court has gone, as pointed out by Mr. Patnam, in upholding tax legislation.

In spite of the desire on the part of the Court to uphold tax laws, and in spite of the apparently simple limitations to the taxing power in the Constitution, it does not follow that all tax laws are automatically constitutional. Very definite limitations are found in the Court's interpretations of the due process clause of the Fifth Amendment, the Sixth Amendment, and the equal protection under the law provision of the Fourteenth Amendment. The nature of these limitations will be examined in detail, starting with the Sixth Amendment, as it is perhaps the most important from the viewpoint of this paper.

It is in the Sixth Amendment that we find the statement that all power not specifically delegated by the Constitution, or expressly prohibited by it to the states, resides in the states themselves. This emphasizes the "delegated" nature of federal powers and brings about the situation where the states may take action

[5] *Ibid.*, January 24, 1939.

[6] *Tyler* v. *United States*, 281 U.S. 497; *Alaska Packers*, 263 U.S. 510; *Van Deman & Lewis* v. *Rast*, 240 U.S. 342, etc.

that is prohibited to the federal government, as, for example, the matter of legislating in regard to child labor. This point is of considerable importance, for while Congress has the definite power to tax, the Court has taken the stand (*Linder* v. *United States*, 268 U.S. 5):

> Congress cannot, under the pretext of executing delegated power, pass laws for the accomplishment of objects not entrusted to the Federal government.

And more specifically in *United States* v. *Butler*, 297 U.S. 1:

> The power of taxation, which is expressly granted, may, of course, be adopted as a means to carry into operation another power also expressly granted. But resort to the taxing power to effectuate an end which is not legitimate, not within the scope of the Constitution, is obviously inadmissible.

This doctrine has its roots in the famous case, *McCulloch* v. *Maryland*, 4 Wheat. 316, where it was stated that should the federal government, in the execution of its powers,

> . . . . adopt measures which are prohibited by the constitution; or should congress, under the pretext of executing its powers, pass laws for the accomplishment of objects not entrusted to the government; it would become the painful duty of this tribunal, should a case requiring such a decision come before it, to say, that such an act was not the law of the land.

It is sometimes thought that since this doctrine looks beyond the mere exercise of the taxing power to the real purpose of the tax law, any tax law passed for purposes other than raising revenue is unconstitutional. This, of course, is not so. The courts recognize that Congress may use the taxing power for other purposes than raising revenue, and the only restriction is that the purpose be within constitutional limits. In fact, the Court has been very liberal in interpreting the word "tax" and has stretched it to include virtual penalties. For example, in *United States* v. *Butler*, *supra*, it was stated:

> It does not follow that as the act is not an exertion of the taxing power and the exaction not a true tax, the statute is void and the exaction uncollectable. For, to paraphrase what was said in the Head Money Cases (112 U.S. 580), if this is an expedient regulation by Congress, of a subject within one of its granted powers, "and the end to be attained is one falling within that power,

the act is not void, because, within a loose and more extended sense than was used in the Constitution" the exaction is called a tax.

Even further, the Court has in some cases refused to consider evidence purporting to show the true motive or purpose of Congress in passing a tax law[7] and has concentrated its attention on the information derived from the wording of the act itself to determine its constitutionality. The latitude that this doctrine gives to tax laws is evident in the cases cited by Mr. Patman[8] and also in such cases as the poll tax on immigrants, the tax on lottery tickets, etc. It should be observed, however, that a tax on bank notes was upheld because the regulation of the currency is a power delegated to the federal government, the tax on immigrants is an exercise of the granted power of controlling external commerce, and the tax on dealers' lottery tickets was considered an act to raise revenue for the federal government. The laws were not upheld because they accomplished a "worthy purpose," for such a consideration is outside the judicial function.

The restrictive aspect of the delegated nature of the powers of the federal government comes into play principally in regard to tax laws that regulate intrastate commerce. A classic example of this is the child labor case (*Bailey* v. *Drexel Furniture Co.*, 259 U.S. 20), where a tax imposed on manufacturers employing child labor was declared unconstitutional. Said the Court:

> . . . . Here the so-called tax is a penalty to coerce the people of the state to act as Congress wishes them to act in respect of a matter completely the business of the state government under the Federal Constitution.

A more recent case is the one involving the processing tax as outlined in the Agricultural Adjustment Act of 1933. In *United States* v. *Butler*, 297 U.S. 1, the Court stated that the purpose of the tax was to regulate agricultural production, and since this was clearly an intrastate enterprise, the law was unconstitutional. A still further case is *Linder* v. *United States*, 268 U.S. 5, where the Court refused to recognize the dispensing of morphine on a bona fide prescription as a violation of the Narcotic Act (a revenue

[7] *McCray* v. *United States*, 195 U.S. 27.

[8] There is no evidence that the tax on machine guns was ever brought before the Supreme Court.

law), even though the drug was given to a known addict. It was held that, as the direct control of medical practice was beyond the power of the federal government, a doctor acting in good faith could not be penalized.

Still another case is *Hill* v. *Wallace*, 259 U.S. 44, where the Court held that a tax on transactions in grain futures in markets outside those designated by the Secretary of Agriculture was an exercise of control beyond the power of Congress. True, the Court later upheld federal control of these transactions in *Board of Trade of Chicago* v. *Olsen*, U.S., 262 U.S. 1, but the point of interest is that the use of the taxing power was unsuccessful, while an outright control based on a careful definition of interstate commerce was approved.

Admittedly, the attitude of the Court in regard to the nature of intrastate commerce has undergone a definite change. As far back as *Swift & Co.* v. *United States*, 196 U.S. 375, the Court broadened the concept of interstate commerce to cover intrastate transactions affecting goods in the flow of commerce from state to state. More recently, in *National Labor Relations Board* v. *Jones Laughlin Steel Corp.*, 301 U.S. 1 (not a tax case), the Court held that labor relations of a company engaged in interstate operation was not a matter of strictly local concern, thus contradicting the point of view indicated in the child labor case described above. However, in spite of this development, there still remains an element of restriction on the federal taxing power whenever it suggests the control of intrastate operations. All commerce is not yet interstate commerce.

No one can seriously question the statement that the operations of an independent retail store are intrastate commerce and, consequently, that any federal tax law operating to control the actions of such stores would be unconstitutional. It is not so clear that a chain organization operating units in several states is engaged in intrastate rather than interstate commerce. To the extent that chains operate warehouses that serve stores in several states or that the chain makes purchases at a central office for shipment to the individual units, the transactions are interstate in character. To the extent that the purchases originate with the

individual stores, the operations are intrastate in nature, and it would be difficult to make a division of the transactions to determine the relative importance of each class.

Granting that the operations of some chains are interstate in character, it does not follow that all chains do interstate business. A group of five or ten stores operating in one city or one state are not engaged in interstate commerce, although they are certainly a chain organization. The point is that the distinction between chain stores and all others is not coincident with the distinctions between interstate and intrastate commerce even after the difficulties in the preceding paragraph are waived, and, consequently, a tax measure to control chains would in many cases affect intrastate business.

It is, of course, impossible to determine whether the Court would consider a tax in chain stores as essentially a revenue device with interference in intrastate commerce as an inescapable accompaniment or whether they would consider the tax as essentially a control measure and thus subject to the charge of extending beyond the power of Congress. Much would depend upon how the law was worded, with the benefit of any doubt favoring the law. Much would depend on the individual philosophies of the members of the Court. Those who favored a strong federal government would find the law a revenue measure; those who feared too much centralization of power might find the law a potential method of controlling retail operations, and, in either event, a logical decision could be reached.

At this point it is interesting to observe that the states have the power to control chain organizations through their own tax laws, and in view of the decision in *Great Atlantic & Pacific Tea Co.* v. *Grossjean*, 301 U.S. 412, the individual states can look beyond state boundaries in determining the tax to impose. Unlike many situations, each state can tax chain stores without regard for the action of other states, as retailing is strictly a local business and the states' actions are not annulled by the failure of a neighboring state to take action. This would not affect the revenue aspect of a federal law but would increase the resistance to control features that might be read into the bill.

The second general limitation to the taxing power of the federal government is to be found in the Fifth Amendment and the Fourteenth Amendment, usually taken together. As interpreted by the Court, these amendments require that a tax law be reasonable in its selection of the taxed subject and not otherwise arbitrary or capricious.

Possibly the best statements of the Court's position in regard to this limitation is found in *Brushaber* v. *Union Pacific R.R. Co.*, 240 U.S. 1:

> So far as the due process clause of the Fifth Amendment is relied upon, it suffices to say that there is no basis for such reliance since it is equally well settled that such clause is not a limitation upon the taxing power conferred upon Congress by the constitution; in other words, that the constitution does not conflict with itself by conferring upon the one hand a taxing power and taking the same power away on the other by the limitations of the due process clause. . . . . This doctrine would have no application in a case where although there was a seeming exercise of the taxing power, the act complained of was so arbitrary as to constrain to the conclusion that it was not the exertion of taxation but a confiscation of property, that is, a taking of the same in violation of the Fifth Amendment, or, what is equivalent thereto, was so wanting in basis for classification as to produce such a gross and patent inequality as to inevitably lead to the same conclusion.

That the Court has actually overruled a tax law on the basis that it violates the due process clause is shown in *Nichols* v. *Coolidge*, 274 U.S. 531, 542. This case concerned the federal inheritance tax law, which stated that, in evaluating estates for tax purposes, transfers in contemplation of death made prior to the passage of the law should be included. The Court, while recognizing the necessity of preventing evasion, refused to allow such transfers to be included. In giving its opinion on this case the Court stated:

> . . . . We must conclude that # 402 (C) of the statute here under consideration . . . . is arbitrary, capricious, and amounts to confiscation.

A better example of the exercise of this limitation is the case of *Stewart Dry Goods Co.* v. *Lewis*, 294 U.S. 550. This case involved a revenue law passed by the state of Kentucky imposing a graduated tax on the gross receipts of retail stores. The tax, of course, was aimed particularly at chain stores but involved all retail in-

stitutions. The Supreme Court held this law unconstitutional on the grounds that the tax was arbitrary, as is shown in the following extract from their opinion:

> The proofs submitted are insufficient to support the appellees' contention that the graduation of the tax was adjusted with reasonable approximation to the net earnings of the taxpayers, and that such minor and incidental inequalities as may be found are those always incident in the application of any valid general rule of classification. We think the graduated rates imposed were not intended to bear any relation to net profits.

While this case is based on a review of state legislation, it presents a principle that is applicable to federal legislation.

Ordinarily it is difficult to forecast just what the Court will consider an unreasonable and arbitrary tax law; but, fortunately, in evaluating the proposed federal chain-store tax law, we have a considerable body of state cases to guide us. From these, particularly *State Board of Tax Commissioners* v. *Jackson*, 283 U.S. 527, we know that it is not unreasonable to impose a graduated tax based on the number of stores under one control,[9] and also that it it not unreasonable to distinguish corporate chains from independent retailers or even filling stations and voluntary chains. There is some reason to doubt whether it is reasonable to exempt groups of less than ten stores,[10] as suggested in the Patman chain-store tax bill; but since this point has not been considered definitely by the Supreme Court, we can say nothing more about it. Furthermore, in view of the decision in *Stewart Dry Goods Co.* v. *Lewis*, *supra*, the exemptions of chains whose gross sales are less than, say, $250,000 may also be questioned; but here again the point is not a strong one. From the point of view of arbitrariness such features are seriously open to question.

When we come to consider such proposals as multiplying the tax by the number of states in which business is done, we find a fairly clear precedent. In the case *Liggett Co.* v. *Lee*, 288 U.S. 517, the Court reviewed a law passed by the state of Florida which not only increased the tax on retail stores according to the number of

[9] The basis on which the Court reached this conclusion has been severely criticized; cf. Phillips, "An Economic Analysis of the Supreme Court's Decisions on Chain-Store Taxation," *Journal of Business of the University of Chicago*, XI, No. 1 (1938), 51–69.

[10] *Great Atlantic & Pacific Tea Co.* v. *Doughton*, 144 S.E. 701.

stores in the group but increased the tax in each level by 50 per cent if the stores were located in more than one county. This law was held to be unconstitutional because it was arbitrary and unreasonable and hence violated the Fourteenth Amendment. The Court said:

> It is evident, however, that the mere spacial relationship between the store and a county line, cannot, in and of itself, affect the value of the privilege enjoyed. The appellees fail to show how the fact that the new place of business lies in another county increases the advantage over that to accrue from a location within the same county. The classification is solely of different chains and the difference between them consists neither in number, size, surrounding population, nor in any factor having a conceivable relation to the privilege enjoyed.

It would seem that if it is arbitrary to tax stores more heavily because they are located in more than one county, it would certainly be arbitrary to multiply the tax if the stores are located in more than one state.

There are, however, two reasons for proceeding with caution in forecasting that even such action would be held unconstitutional. In the first place, Mr. Justice Brandeis, Mr. Justice Cardozo, and Mr. Justice Stone dissented from the majority opinion of the Court in the Liggett case. Mr. Justice Brandeis pointed out that there was nothing to show that the provisions of the law might not be reasonable in view of special conditions prevailing in Florida, and, since there is always a presumption in favor of constitutionality, the law should have been upheld. In other words, it is not necessary to show that a law is reasonable to make it constitutional; it is necessary to show clearly that it is unreasonable before it is unconstitutional. The dissenting opinion of Mr. Justice Cardozo contains a statement that is even broader in its implications. He held, and Mr. Justice Stone concurred, that

> there is a presumption that the legislature did not classify along the lines of counties without study of the relevant data or without an informed and considered judgment. Its findings are not subject to annulment of the court unless facts within the range of judicial notice point to them as wrong. In discarding as arbitrary symbols the lines it has chosen, there is danger of forgetting that in social and economic life the grooves of thought and action are not always those of logic, and that symbols may mean as much as conduct has put into them.

While Mr. Justice Brandeis and Mr. Justice Cardozo are no longer members of the Court, their statements represent a point of view that might be adopted by Mr. Justice Douglas, Mr. Justice Frankfurter, and Mr. Justice Black.

The second reason for hesitating is that the Supreme Court seems to have been more liberal in its interpretation of federal laws than of state laws. This shows up most clearly in the decisions of what constitutes a state instrumentality and what constitutes a federal instrumentality. If this slight bias carries over into other laws, it might be sufficient to swing the decision, as the Court was fairly evenly divided in the Liggett case.

Before leaving this discussion of unreasonableness, it should be pointed out that a law is not unconstitutional merely because it imposes such a heavy burden on some corporations that it forces them out of business. This point has been repeatedly made by the Court[11] and is based on the philosophy that the responsibility of the legislature for a burdensome tax law is to the electorate rather than to the Court. There is, then, from the point of view of the Court, no such thing as an unreasonably high tax. On the other hand, a law that is arbitrary in nature will not be held constitutional merely because the burden it imposes is light. The Court recognizes that the burden may be increased at some future time to such an extent that damage may be done. This point is clearly stated in *Stewart Dry Goods Co.* v. *Lewis, supra.*

> Once the lawfulness of the method of levying the tax is affirmed, the judicial function ceases. He deludes himself by a false hope who supposes that, if this court shall at some future time conclude the burden of exaction has become inordinately oppressive, it can interdict the tax.

It is therefore quite clear that the amount of a tax has nothing to do with its constitutionality.

In summary it can be said that, while there is nothing to pre-

[11] *Veazie Bank* v. *Fenno*, 8 Wall. 533: "So if a tax bears heavily upon a corporation, or a class of corporations, it cannot for that reason only, be pronounced contrary to the Constitution." *A. Magnano Co.* v. *Hamilton*, 292 U.S. 40: "If a contrary conclusion were reached in this case, it would rest upon nothing more than the single premise that the amount of the tax is so excessive that it will bring about the destruction of the appellant's business, a premise, which, standing alone, this court has heretofore uniformly rejected as furnishing no judicial grounds for striking down a taxing act."

vent federal taxation of chain stores for revenue purposes, it is not impossible for such a law to be held unconstitutional on the grounds that it does or might exercise a control over intrastate business in a degree beyond the power delegated to the federal government. Furthermore, even if a federal tax on chain stores is held constitutional, there is evidence that whatever law is passed will not be supported by the Court if it contains such unusual features as multiplying the tax by the number of states in which business is done. Thus it appears that the possibility of federal taxation is certainly no greater than the possibility of state taxation, and in some respects it is somewhat less, even with political aspects disregarded.

APPENDIX

TEXT OF BILL[12]

H. R. 1, a bill providing for an excise tax on retail stores, introduced in the House of Representatives on January 3, 1939, and referred to the Committee on Ways and Means, is as follows:

a) On and after the effective date of this act every person opening, establishing, operating, or maintaining under the same general management, supervision, ownership, or control 10 or more retail stores shall pay annually an excise tax for each fiscal year ending June 30, measured by the number of retail stores so opened, established, operated, or maintained during such fiscal years as follows, except as provided in subsection (*b*) hereof:

For each store not in excess of 15, $50 a store;
For each additional store not in excess of 25, $100 a store;
For each additional store not in excess of 50, $200 a store;
For each additional store not in excess of 75, $250 a store;
For each additional store not in excess of 100, $300 a store;
For each additional store not in excess of 200, $450 a store;
For each additional store not in excess of 300, $600 a store;
For each additional store not in excess of 400, $750 a store;
For each additional store not in excess of 500, $900 a store;
For each additional store in excess of 500, $1,000 a store.

b) For the first fiscal year beginning on July 1 following the date of enactment of this act, the tax under this section shall be one-half of the amount determined in accordance with subsection (*a*) hereof; and for the second fiscal year, the tax shall be three-fourths of the amount determined in accordance with such subsection.

SECTION 2. If any person subject to the tax imposed by section 1 opens, establishes, operates or maintains during the taxable year retail stores under

[12] *Congressional Record* (76th Cong., 1st sess.).

the same general management, supervision, ownership, or control located in more than one State, the tax imposed by section 1 shall be multiplied by the number of States (including the District of Columbia) in which any of such stores are located except that for the first fiscal year beginning on July 1 following the date of enactment of this act the tax shall be one-fourth of 1 per cent of the amount determined in accordance with the preceding provision hereof and that for the second fiscal year the tax shall be one-half of 1 per cent of the amount determined in accordance with such provision. If this section or any provision or application thereof shall be held invalid the validity or application of section 1 shall not be affected thereby.

SEC. 3. (*a*) [Administrative only.]

SEC. 4. When used in this act. . . . .

a) The term "person" shall include any individual, corporation, partnership, association, joint stock company, or business trust, however organized and whether or not incorporated, but does not include any such person if during the taxable year the gross business of the retail stores opened, established, operated, or maintained by it does not exceed $250,000, or in case of the taxable period between the effective date and July 1 following, does not exceed such part of $250,000 as such period bears to a year.

b) The term "retail store" shall mean and include any store or mercantile establishment in which goods, wares, or merchandise of any kind or description are sold at retail; but said term shall not include any filling station engaged primarily in the sale or distribution of petroleum products and not engaged in the sale or distribution of automobile tires or tubes, any establishment or facility maintained by a common carrier as part of its transportation facilities primarily for furnishing meals or other commodities to its passengers and employees, or any branch office maintained by a newspaper for the distribution of its papers or for taking subscriptions or advertisements therefor, and shall not include individually owned stores, whose revenues in part or in whole are not made available to or inure to the immediate or ultimate benefit of any other individual store, store owner, or any other person, firm or corporation operating a retail store as herein defined.

c) The term "Under the same general management, supervision, ownership, or control" shall include control or direction by one management or association of ultimate management, whether by legal control direct or indirect, or by actual control, direct or indirect, through ownership or control of evidences of indebtedness, physical property, or other assets, through contract, lease or agency arrangements, through interlocking directors or officers, or through any other means.

d) [Administrative only.]

SEC. 5. If any provision of this act, or the application thereof to any person or circumstance, is held invalid, the remainder of the act, and the application of such provision to other persons or circumstances, shall not be affected thereby.

DEPRECIATION INVENTORIED

The purpose of this brief discussion is not to defend my book, *Depreciation*, reviewed at page 303 of the July, 1939, issue of the *Journal of Business*, by Robert L. Dixon, Jr. The book is not perfect and would not have been written had its writing been deferred until it could have been made perfect and, as Mr. Dixon suggests, an "inventory" of depreciation. The purpose here is simply to refute a few erroneous ideas set forth in the review.

1. Mr. Dixon states that depreciation reserves are merely a bookkeeping convenience. It is submitted that they are more than this; that, on the contrary, they reflect a definite reduction in value of fixed assets, preserved usually in the form of increased working capital, and hence reflect a fundamental process in valuation.

2. Mr. Dixon expresses surprise at the "perpetuation" of the use of the term "reserve for depreciation," with its misleading implications. It is submitted that this expression is less misleading than any other as yet proposed, and that its implications are understood by all who compute the income tax for corporations. It may be noted that Sanders, Hatfield, and Moore, in their *A Statement of Accounting Principles*, state that "common practice has adhered" to the use of the term "reserve" in this connection. Practically all published corporation balance sheets employ the "reserve for depreciation." It is the terminology employed by the Bureau of Internal Revenue. Mr. Dixon objects to the statement that "the proper function of the depreciation reserve is to provide for the replacement of original cost," stating that Professor Hatfield has made a collection of such quotations. Perhaps this accounts for the statement by Sanders, Hatfield, and Moore that "it is a common thing to speak of the reserve [*sic*] for depreciation as the source of the new assets."[1]

3. Mr. Dixon appears to forget that replacements are rarely identical in character with the abandoned assets. This is true, however, because of the progress constantly being made in the field of invention and because of the constant improvement of productive processes. With this truth in mind it is entirely appropriate to say that it is "important that it [the reserve] shall be sufficient to make the necessary replacements when desired" without inferring that the reserve

[1] *A Statement of Accounting Principles*, p. 64.

applicable to a particular asset shall provide for the specific replacement of that asset.

4. Mr. Dixon regrets that the two earlier editions of the book were written by the author of the third edition. Here is food for thought, and care ought to be taken in selecting an author for the fourth edition, in order that depreciation may receive the "inventorying" Mr. Dixon says it deserves.

5. It should be reaffirmed that the adjustment for depreciation made at the end of the accounting period "results not in loss, but in recovery of disappearing values." It is submitted that this is the very basis of correct procedure and correct thinking on this basic topic.

6. The implication in Mr. Dixon's concluding paragraph that academicians comprise a superior group not to be compared with professional accountants, engineers, and lawyers needs refutation. It is submitted that, on the average, they are not more intelligent than those who are engaged in the practical professions, and that an appeal of a higher order need not be made to the academic fraternity.

EARL A. SALIERS

REJOINDER

1. As compared with making credits directly to the asset account, the use of a reserve for depreciation is more satisfactory because it is more revealing. Where the reserve is properly used three facts are displayed for the statement reader: original cost or other basis, total recognized depreciation to date, and net book value. Only net book value would be shown under the other method. Beyond being a convenient method of revealing these additional facts, the reserve for depreciation has absolutely no purpose or power.

In a great many published balance sheets one will find that the current asset total is less than the total of the reserves for depreciation, yet we are led to believe that the presence of a depreciation reserve reflects assets preserved in the form of increased working capital, presumably over and above the basic working capital needs of the business. It cannot be overly stressed that the prime purpose of accounting is to reflect events which *have* happened. Any relationship which may exist between an accounting entry and the preservation of working capital, or any other *future* financial occurrence, exists only by virtue of intervening decisions of management.

2. It is unfortunate that all readers of published statements are

not income tax experts. If that were the case the term "reserve" might be retained on the assumption that such experts are aware of the fact that with reference to depreciation in particular the word doesn't mean reserve at all. Actually all persons are not income tax experts and the layman is generally quite certain that "reserve" refers to something set aside for contingent use—a sort of financial cushion.

The quotations involving Professor Hatfield, it may be noted, are not expressions of his own views but merely expressions of common practice. On page 138 of his own book, *Accounting*, he states that the term "allowance" is more satisfactory than the term "reserve." Furthermore, on page 137, Professor Hatfield says, "It is not uncommon to find depreciation defined as 'a sum of money set aside out of profits to provide for the replacement of an asset.' This statement contains so many grievous misconceptions that it deserves careful analysis."

3. That replacements are rarely identical in character with the abandoned assets is a truism. In summarizing the accounting problem Mr. Saliers says, "Accounting deals with cost rather than value, and replacement allowances are made on the basis of the cost of the unit replaced, not on the basis of its exchange value or on the cost of the replacement" (p. 61). Yet in his reply he states that it is "important that it [the reserve] shall be sufficient to make the necessary replacements when desired." The two quotations would be in harmony only with reference to periods of declining price level or under static economic and technological conditions. Perhaps it was Mr. Saliers who forgot the truism.

4. The only regret expressed was that the recent edition does not show due recognition of the progress and writings of other accountants since 1922—the date of the former edition.

5. The adjustment for depreciation results "in recovery of disappearing values." This statement certainly cannot be taken literally.

6. This point is well taken. Mr. Saliers and I are academicians.

R. L. Dixon, Jr.

University of Chicago

BOOK REVIEWS

Studies in Income and Wealth. By the CONFERENCE ON RESEARCH IN NATIONAL INCOME AND WEALTH. New York: National Bureau of Economic Research, Inc. Vol. I (1937): Pp. xv+348. $2.50. Vol. II (1938): Pp. xii+331. $3.00.

The interest of the National Bureau of Economic Research in problems of estimating national income and wealth led it in 1935 to call a conference of representatives of departments of economics of leading universities and of different agencies of the federal government. The aim was to facilitate co-operation, co-ordinate research, and stimulate further effort in this field. So successful was the first meeting in 1936 that the Conference on Research in Income and Wealth was established as a separate and permanent entity, and has since held further meetings in December of 1937 and in April of 1938. Volume I of the *Studies in Income and Wealth* is essentially a carefully edited and arranged transcript of the proceedings of the 1936 Conference; Volume II contains the papers and discussions of the latter two meetings.

In view of the wide and increasing use of "national-income" figures as objectives of public policy, as measures of national welfare, and as criteria of the success or failure of legislation, the National Bureau is to be commended for its effort to unify the conceptions and statistical procedures of the "experts" in the field. Also to be commended is the aim of the Conference to "stimulate scrutiny" rather than "to distill immediately and directly a uniform concensus of opinion on these controversial problems." An effort rapidly to attain standardization of terminology might well have been self-defeating. Such lack of unity in subject matter and development as the *Studies* display should be regarded as the unavoidable product of an effort to bring together students with widely differing interests and points of view. Despite the inclusion of a vast area of fundamental economic research, the *Studies* retain a cohesiveness that is truly remarkable. The series of research reports and monographs which they contain, together with the critical comments of discussants, are of uniformly high quality. One hazards little in predicting that these two volumes, together with those that are expected to follow from future conferences, will constitute a *sine qua non* in any serious examination of national income and wealth. A

majority of American economists whose names have been connected with contributions in this field were participants. Few, if any, crucial issues have been overlooked. It is to be hoped that joint efforts of this type may be made in other fields of economic research with results as stimulating and as fruitful.

It was inevitable that the subject matter of the *Studies* should range over a wide field, including within its periphery economic principles, statistics, accounting theory, taxation, and monetary and business-cycle theory. Limitations of space preclude more than a brief description of content, together with notations of certain contributions that appear especially significant to the reviewer, and the raising of a few questions.

VOLUME I

Volume I is divided into eight parts, the first of which contains a paper by M. A. Copeland on "Concepts of National Income," with discussion by Simon Kuznets and Clark Warburton. The basic national-income concept urged by Copeland is a "productivity" concept, holding that national income is the "net social value product derived from the operation of the economic system before taking into account valuation readjustment." This concept fairly coincides with the "national income produced" estimates presented by the Department of Commerce. Copeland contends that "national income paid out" estimates, which differ by the amount of additions to business surpluses, are not of co-ordinate importance. Kuznets takes issue with this position. While agreeing that "national income produced" is the fundamental concept, he urges that "national income paid out" constitutes an important segment. Warburton sides with Copeland in this matter. He makes the further interesting suggestion that the designations of various statistical methods of summing items entering into national income should be (1) summation of distributive shares, (2) value added summation, (3) summation of value of final products, (4) summation of income received, and (5) summation of consumers' purchases and savings. With adequate data and correct statistical procedure all of these approaches should yield the same result.

Part II consists of a paper by Warburton entitled "Accounting Methodology in the Measurement of National Income." Warburton indicates how the use of different accounting conventions, any one of which might be appropriate for certain purposes, would result in materially different dollar totals for national income or national wealth.

One may observe that, since interest centers on annual comparisons of these magnitudes, it would not appear to be vital which method is selected so long as it is used consistently. One subject of Warburton's paper—dealt with extensively by other participants in the conference—was the treatment of government expenditures in national income. Warburton suggests that the criterion for inclusion or exclusion of "free" governmental services should be the incidence of taxation. If the cost of such services is met with price-raising tax levies, then it is appropriate not to add their value to national income; if it is met by taxes that serve to reduce money incomes of the factors of production, then the value of "free" services should be added. One may observe that many taxes have both results in part, and the repercussions vary through time. Hence Warburton's crude estimate that "at least half of the revenues used by governments in the United States in 1929 was raised by methods that had the effect of reducing the money value of the incomes drawn by individuals from business rather than of raising the prices of commodities purchased by consumers" appears open to question. Warburton argues plausibly that capital gains realized by individuals should be included among the items listed and evaluated, if national income is measured by a process involving consolidation of income and expenditure statements of families. His reason is that their exclusion would produce distortion in the frequency curve of income distribution, a conclusion that seems correct if we are interested in personal distribution of national income rather than in its total.

In Part III Solomon Fabricant contributes a penetrating analysis, "On the Treatment of Corporate Savings in the Measurement of National Income." He seeks to determine the extent to which current accounting concepts of corporate saving are reconcilable with economists' concepts of national income, by examining the implications of accounting definitions of the fiscal period, of the time allocation of revenue and cost, of price changes, and of capital versus revenue items. Fabricant concludes that the economic statistician should regard accounting statements of corporate savings merely as the clay from which the bricks going into the national-income structure are fashioned. They are not materials ready for use.

The most profound distortions in accounting reports of business savings arise through changing inventory valuations through the business cycle. This subject, touched upon by Fabricant, is exhaustively analyzed in a paper by Kuznets which constitutes Part IV. Kuznets makes it clear that, whether prices rise or decline, and whether inven-

tories are valued at cost or at the lower of cost or market, providing any one method is used consistently the value of inventories consumed in annual production as reported in business accounts differs from the value required for a proper estimate of national income. Business practice overstates profits in prosperity and understates profits in depression, thus intensifying fluctuations in the otherwise sensitive element of business saving.

Part V contains a paper by Gerhard Colm on "Public Revenue and Public Expenditure in National Income," with discussion by J. M. Clark, Kuznets, and Newcomer. The upshot of Colm's elaborate and suggestive analysis is that the treatment of governmental activities in national income depends both upon the purposes for which government expends money and the revenue devices by which expenditures are met. Colm assumes that a distinction must be made between those governmental services rendered to the business system and those rendered to individuals as consumers. The writer is inclined to concur in the skepticism expressed by Kuznets as to the feasibility of making such a distinction.

Part VI contains a paper by Carl Shoup on "The Distinction Between 'Net' and 'Gross' in Income Taxation," with discussion by Roy Blough and W. W. Hewett. Shoup points out the implications for students of national income of the particular statutory and regulatory provisions of the federal income tax concerning deductions allowed from gross income to arrive at the net-income figures used by statisticians. The items "business expenses," "depletion," and "depreciation" are especially tricky and change through time with adoption of new regulations.

Part VII contains a paper by Solomon Kuznets on "Some Problems in Measuring Per Capita Labor Income," while the final part, VIII, consists of a paper by O. C. Stine entitled "Income Parity for Agriculture." In the latter memorandum Stine discusses the many problems of estimating "income parity" for the farm population as required under the Soil Conservation and Domestic Allotment Act of 1936. The two last-mentioned papers are concerned with the application of concepts in particular segments of the economy rather than with the broader issues of defining and measuring national income.

VOLUME II

The memoranda in Volume II are fewer in number, and, if anything, even broader in scope and more penetrating than those in the first

volume. Simon Kuznets' paper on "The Measurement of National Wealth" impresses this reviewer as a fundamental and thoughtful treatment of the subject. Noting the necessary distinctions between national wealth and the sum of individual wealths, Kuznets observes that national wealth can be computed either by the "substantive" approach of evaluating various classes of material and nonmaterial wealth, or by the "claims" approach of summing the individual and collective claims upon wealth of persons in a community. (One may question his inclusion of good-will, patent, or other monopoly powers of an individual business enterprise among the intangible items of national wealth. Surely there is just as good ground for regarding them as deductions!) National wealth broadly combines the idea of substantive "sources of desirable events" subject to ownership, according to Kuznets' definition, and several variants may be distinguished, each defensible for certain purposes. The problem of reducing all items of wealth—however defined—to a common unit of measurement may be met by capitalizing expected future incomes, use of current market prices, computation of current reproduction costs, or summation of original costs. None of these methods is free from ambiguity in theory and from serious deficiencies in the data necessary for its application. Moreover, the objectives of national wealth computation have much to do with selection of method. Critical examination of different objectives lead Kuznets to conclude that use of national-wealth estimates for most purposes does not promise results significant enough to justify the labor of compilation. Measures of national income are less dubious and more fruitful.

The reviewer wonders whether the difficulties Kuznets has so ably presented are not in part the result of a too inclusive definition of wealth. As Copeland pointed out, "virtue, beauty, social distinction, and truth are evidently included in wealth according to Dr. Kuznets' concept." A scientific definition would run in terms of methods of measurement—that is, in terms of a consolidation of individual balance sheets.

Part II contains a paper by M. A. Copeland and E. M. Martin on "The Correction of Wealth and Income Estimates and Price Changes." The authors properly point out that devaluation of dollar-value indexes is merely an indirect way of constructing indexes of physical volume. Hence it is necessary to specify what physical volume is sought to be measured when national income is deflated. They propose that na-

tional income may properly be deflated in different ways and certain segments may be deflated to represent corresponding physical volumes.

Part III probably will be more widely read than any other portion of the volume. Here Gottfried Haberler has made a lucid and penetrating exploration of that *terra incognita* lying between estimates of national income and wealth and recent business-cycle literature on saving and investment in his paper entitled "National Income, Saving, and Investment." While Haberler makes some extremely effective criticisms of Colm's treatment (in Volume I) of government services and national income, he provides a really significant contribution by examining concepts of saving and investment from the viewpoint of their adaptability to statistical measurement. Haberler notes that all of the concepts state or imply a distinction between savings and investment in an *ex ante* (expectation) and in an *ex poste* (realization) sense. That is, the saving of a given period may be measured *ex poste facto*, but it will usually differ from the amount of saving intended or expected to be made in that period. Statistically, saving and investment should both be defined identically as unconsumed output, and these magnitudes may be computed either from the money side, by calculating money incomes of consumers and deducting consumption expenditure, or from the real side, by measuring the output of new capital and of consumers' goods respectively. Haberler expresses skepticism at evaluating the volume of savings *ex ante* by statistical methods. Any difference between savings and investment *ex poste* must be due entirely to completeness or reliability of data.

Part IV contains a careful analysis of "Capital Gains in Income Theory and Taxation Policy" by Roy Blough and W. W. Hewett. The authors first seek to give quantitative explanation to capital gains as part of a social-income concept, and deal next with capital gains as applied to the theory of personal-income taxation. In the view of the authors—with which the reviewer concurs—application of the same concept of "income" for both purposes is inappropriate. Clearly, increases in the community's stock of physical equipment are something quite different from increases in the money value of assets held by individuals. Gifts, inheritances, fraudulent or predatory activity, and monopoly all illustrate economic gains to individuals that do not represent increases in national income; but they do represent shifts in individual control over economic goods that give rise to ability to pay taxes. Appreciation in property value may arise from (1) production,

(2) changes in rates of capitalization, (3) changes in the prospective income stream from property, and (4) changes in price levels. Only those gains in property value reflecting production are a part of national income defined in the "productivity" sense. The authors express a preference for defining personal income for purposes of taxation as individual accretions to economic power between two points of time. They properly point out that there is little reason for discriminating between capital gains and other income from the viewpoint of tax justice, although it is feasible as an administrative matter to adopt many variants of policy in taxing capital gains, the effects of which are examined by the authors. They emerge with the conclusion that no method either of taxing capital gains or of exempting them is superior in all respects to all other methods. But they give no evaluation of the different factors which, in their opinion, should determine policy.

In Part V the attention of the Conference was again directed back to the connection between governmental activity and national income. A paper by G. C. Means, Laughlin Currie, and R. R. Nathan on "Problems in Estimating National Income Arising from Production by Government" was presented. The authors endeavor to develop a method of valuation based upon allocated costs of production, and utilize this as a basis for criticizing Kuznets' use of tax payments as a measure of national income provided by government. In discussion, Kuznets subjects the paper to searching criticism. In the reviewer's opinion, the analogy between business activity and governmental activity upon which Kuznets proceeds is essentially correct.

The sixth and last part is a study by R. W. Nelson and Donald Jackson on "Allocation of Benefits from Government Expenditure." Here the authors seek to determine the real income received from government by farm residents in the form of consumers' goods and services, and the amount of aids to productive activities furnished by government to farm residents during the fiscal year 1936. Obviously, some tenuous assumptions were necessary, particularly with respect to relief and highway expenditures.

Economists will find much food for thought in these two volumes. They will look forward with interest to the appearance of subsequent publications of the Conference.

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National Income and Capital Formation, 1919–35. By SIMON KUZNETS. New York: National Bureau of Economic Research, 1937. Pp. x+86. $1.50.

Commodity Flow and Capital Formation, Vol. I. By SIMON KUZNETS. New York: National Bureau of Economic Research, 1938. Pp. viii+505. $5.00.

These two volumes not only continue the pre-eminence enjoyed by the National Bureau of Economic Research, of which Dr. Kuznets is a research staff member, as the leading American authority on the measurement of national income; they constitute a landmark of progress in this field. The first-named volume was published in 1937 and is subtitled "A Preliminary Report." It contains a complete revision of the estimates by W. I. King of national income for 1919–28 (published by the National Bureau in 1930 as *National Income and Its Purchasing Power*) together with their continuation through 1935. The second volume was published in 1938 and contains a detailed description of the sources and methods used in obtaining estimates of national income and capital formation. The elegant design and format of both these $8\frac{1}{4}\times 11\frac{3}{4}$-inch volumes does justice to their scholarly and authoritative content. They will be welcome additions to the library of every student of this timely subject.

In the Introduction to *National Income and Capital Formation* Kuznets states: "This report seeks to answer five questions: (1) How can the product of the nation's economic activity be defined? (2) How large has the national product been since the War? (3) In what part of the nation's economic system was it produced? (4) How was its monetary equivalent distributed? (5) How was the product utilized?" A section is devoted to answering each question.

Kuznets' definitional treatment is similar to that presented by him at the Conference on Research in Income and Wealth. (See review of *Studies in Income and Wealth.*) Net national product, or national income, is defined as the *net* value of commodities and services produced by the nation's economic system after deducting the values of fuel, raw materials, and capital equipment consumed in the process of production. *Gross* national product is the same quantity before making these deductions and can be measured more accurately because of the difficulties of measuring current consumption of durable goods. National income may also be defined and measured at the stage of distribution or at the stage of consumption, but apart from statistical

difficulties the results of the three definitions should be identical. In practical procedure it is necessary to ignore activities (such as housewives' services) that are not closely connected with the market. Kuznets also excludes the products of illegal activity.

So defined, net national product in 1929 prices averaged nearly $66 billions annually over the period 1919–35, or about $9 billions less than the $75 billions of gross national product. In relation to population, national income (in 1929 prices) averaged less per capita, per gainfully occupied person, or per consuming unit in the latter than in the first half of the period.

Distribution of the net national product according to industrial origin revealed the not unexpected fact that over 61 per cent originated in industries other than those producing tangible commodities. The relative importance of the service industries increased significantly since the war when measured in current prices but remained constant when measured in 1929 prices. The inference is that prices of commodities declined relatively more than did prices of services during the period succeeding 1919.

Measurement of the distribution of the national income according to type of income produced the significant fact that employees' compensation (wages, salaries, pensions, relief) constituted about 70 per cent of total flow of income payments to individuals. Moreover, the relative importance of this item tended to increase over the period, whereas the importance of entrepreneurial income payments, dividends, and interest declined markedly in the last years of the period.

Kuznets also studied national income cross-classified by type of payment *and* by source. The growth and change of different industries appeared to him to be the independent factor that provided the framework within which changes in percentage distribution of type of payment are to be understood. The data indicated not only a shift from the commodity-producing to the service industries but also a shift from wage-earning labor in basic industries to white-collar salaried labor in trade and in the service industries. Over the period as a whole, the income of wage-earners in basic industries constituted a declining share of national income.

In apportioning national income between consumers' outlay and capital formation, Kuznets makes the households of the nation the point of reference at which the continuous flow of economic goods may be observed and measured. At this point national income divides into consumers' outlay (the value of finished commodities and services

passing into consumers' hands) and capital formation (the sum of changes in stocks of finished and unfinished goods plus changes in claims against foreign countries). Kuznets presents first the apportionment of the *gross* national product between gross capital formation and consumers' outlay. Exclusive of consumers' durable commodities but inclusive of residential construction, gross capital formation averaged $14 billions over the period in current prices, and $13.5 billions in 1929 prices. Inclusion of movable durable consumers' commodities raised the average to $21 billions in current prices and $20.6 billions in 1929 prices. During 1920–29 gross capital formation constituted 20 per cent of the gross national product; since then it has fallen to about half that relative amount. Kuznets believes that full understanding of what has happened since 1919 may be achieved only by carrying the studies back to the first decade of the twentieth century. These researches are now in progress.

Subtracting from gross capital formation the estimated consumption of all durable capital goods utilized in the process of production, *net* capital formation is next compared with consumers' outlay. In this connection the work of Solomon Fabricant, since published under the title *Capital Consumption and Adjustment*, was utilized. While estimations of depletion and depreciation of capital assets are subject to wide error at best, it appeared that a large part of the total goods diverted into investment was offset by current consumption of existing durable commodities. Of the average annual value of gross capital formation for the entire period, 62 per cent in current prices and 68 per cent in 1929 prices was accounted for by capital consumption. Only the remainder could be considered as *net* addition to the community's stock of durable goods. Including net changes in business inventories, net capital formation of all kinds averaged $5.2 billions annually over the period, and government accounted for nearly 30 per cent of the total, including the influx of gold. It is striking to reflect that, during 1919–34, only 8 per cent of national income on the average represented additions to capital stock and that since 1929 and up to 1934 the net addition was negative. Here is dramatic evidence of the ravages of the depression.

The composition of consumers' outlay was also analyzed. This magnitude was estimated not directly but by subtraction of capital formation from national income. Defining consumers' outlay to include everything spent on consumers' goods except residential housing, it was found that cost of perishable commodities accounted for 40 per

cent, semidurable commodities for about 17 per cent, durable commodities for about 12 per cent, and services for about 31 per cent of total consumers' outlay over the period. Only during the disturbed years immediately after the war and during the 1929–32 depression did any marked changes occur in these relative positions.

Volume I of the work entitled *Commodity Flow and Capital Formation* is described in its Foreword as "largely a detailed account of the data and statistical devices used, the decisions made at each stage of the inquiry, the assumptions implicit in the statistical operations and the probable effects of these assumptions upon the reliability of the results." A more extensive discussion of the theoretical issues involved in the definitions and classifications underlying the measures, and an attempt to indicate the wider bearing of these measures are deferred to a proposed second volume. The authors express the hope that Volume I will enable critical readers to judge the validity of methods and reliability of results, will furnish information on particular elements in the flow of commodities and services, and will provide basic materials for use by other students. Necessarily a co-operative work because of its magnitude, the volume presents efforts to fill current gaps in the data necessary to estimating gross and net capital formation. The volume is a work of vast laboriousness and great statistical ingenuity, and contains eight parts, the content of which may be briefly described.

Part I classifies the "value of products" data in the Census of Manufactures, industry by industry, for each census year of the period 1919–33 into finished and unfinished commodities, and classifies finished commodities by degrees of durability. Part II supplements data from the Census of Manufactures with estimates of nonmanufactured finished commodities, and interpolates the value of finished manufactured goods for even years in the period. Part III traces the flow of finished commodities through the channels of transportation and the distribution system and endeavors to estimate the spread in 1929 between producers' values and the ultimate costs to consumers for many groups of goods. Part IV assembles sample data on transportation costs and distributive margins available continuously for several years in order to throw light upon their variability over time. Part V estimates the spread between producers' values and the cost to ultimate consumers of finished commodities and derives the final estimates of the flow of these goods to ultimate consumers at the cost to them. Part VI presents estimates of the volume of construction ma-

terials produced in each year of the period and their value in the hands of ultimate users. In Part VII data are assembled on year-end inventories and are corrected for price changes to obtain net changes in inventories in constant prices. By multiplying the latter by indexes of current prices, net changes in inventories in current prices are obtained. The final part is a summary in which is assembled all the final estimates of the various constituents of gross capital formation. A few of the more important findings have already been mentioned.

Once again economic statisticians are indebted to Dr. Kuznets and his co-workers for a lucid and competent presentation of their findings and a frank confession of their doubts and misgivings with regard to certain methods and assumptions. Business-cycle theorists especially will make liberal use of the magnitudes they have so carefully sought to determine. One looks forward to the appearance of the second and completing volume of this research project.

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Federal Tax Course. By PRENTICE-HALL. New York: Prentice-Hall, Inc., 1940.

As in the past, the Prentice-Hall tax course satisfactorily fills the needs of those who desire an interpretation of the income tax laws and regulations. The great number of illustrative examples are very helpful. It is doubtful, however, that a straightforward study of the text by itself would serve any worth-while educational ends. The burden is left to the instruction to search for the more or less elusive reasons behind the individual provisions of the taxing act. Well suited to this purpose is Seideman's *Legislative History of Federal Income Tax Laws.*

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The Consumer in Commercial Banking. By HENRIETTA COOPER JENNINGS. New York: Consumer Credit Institute of America, Inc., 1939. Pp. xiii+152. $2.00.

This book, the winner of the first prize in the essay contest on consumer credit sponsored by the above institute, attempts to give a general picture of the relative importance of the personal loans of commercial banks in the field of consumer credit, the latter term being defined as credit granted for the purchase of consumption goods.

After a description in chapter i of the other agencies making consumer loans there is an excellent discussion (chap. ii) of the doubtful legality of two devices used by banks in making personal loans, viz.: discounting the interest charge and requiring repayment in instalments. In spite of this uncertainty the author, in chapter iii, notes the increasing entrance of banks into the field since 1934 and the factors responsible therefor. Of these, the most importance is attached to Title F of the F.H.A.; in fact, a separate chapter (iv) is devoted to a description of the act and its influence. Of the other factors, the one arguing for the relative superiority of personal loans over bonds as a means of increasing liquidity and as a possible protector against inflation is of doubtful validity and needs extended analysis.

The last two chapters are devoted to personal-loan department routine and costs—the discussion of costs, as the author admits, being perforce very general owing to the lack of adequate data. The author overstresses the competitive advantage banks allegedly get from cheap working capital through low interest deposits; this assumes other things are equal—an assumption invalidated by the present state of the usury laws. On page 129 the point is made that banks have larger-size loans than other agencies, thus giving them a cost advantage; if anything, the reverse is true—again, because of the usury laws. The suggestion of a licensing system limiting the number of banks in the field to permit larger volume per bank and hence lower costs involves serious questions of social policy.

The reviewer cannot resist mentioning, in closing, the statement on page 1 that consumer credit is necessary to make consumer demand effective. The underconsumption theory in one form or another is seemingly growing in favor.

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